

Switch-mode Power Rectifier

45 V, 40 A

MBR40L45CTG, NRVBB40L45CTT4G

Features and Benefits

- Low Forward Voltage
- Low Power Loss/High Efficiency
- High Surge Capacity
- 175°C Operating Junction Temperature
- 40 A Total (20 A Per Diode Leg)
- Guard-Ring for Stress Protection
- NRVBB 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 are RoHS Compliant

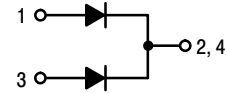
Applications

- Power Supply – Output Rectification
- Power Management
- Instrumentation

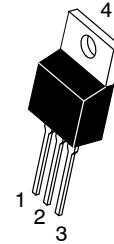
Mechanical Characteristics:

- Case: Epoxy, Molded
- Epoxy Meets UL 94 V-0 @ 0.125 in
- Weight (Approximately): 1.9 Grams (TO-220)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead Temperature for Soldering Purposes: 260°C Max. for 10 Seconds
- Shipped 50 Units Per Plastic Tube for TO-220

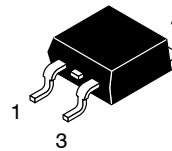
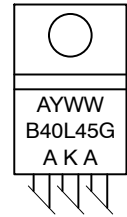
SCHOTTKY BARRIER RECTIFIERS 40 AMPERES, 45 VOLTS



MARKING DIAGRAMS



TO-220
CASE 221A
STYLE 6



D²PAK 3
CASE 418B
STYLE 3



B40L45 = Device Code
 A = Assembly Location
 Y = Year
 WW = Work Week
 G = Pb-Free Device
 AKA = Polarity Designator

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|-----------------|--------------------------------|-----------------------|
| MBR40L45CTG | TO-220 (Pb-Free) | 50 Units/Rail |
| NRVBB40L45CTT4G | D ² PAK 3 (Pb-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 Specification Brochure, BRD8011/D.

MBR40L45CTG, NRVBB40L45CTT4G

MAXIMUM RATINGS (Per Diode Leg)

| Rating | Symbol | Value | Unit |
|--|---------------------------------|-----------------|------------------------|
| Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage | V_{RRM} V_{RWM} V_R | 45 | V |
| Average Rectified Forward Current (Rated V_R) $T_C = 145^\circ\text{C}$ | $I_{F(AV)}$ | 20 | A |
| Peak Repetitive Forward Current (Rated V_R , Square Wave, 20 kHz) | I_{FRM} | 40 | A |
| Non-repetitive Peak Surge Current (Surge applied at rated load conditions half-wave, single phase, 60 Hz) | I_{FSM} | 200 | A |
| Operating Junction Temperature (Note 1) | T_J | -65 to +175 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -65 to +175 | $^\circ\text{C}$ |
| Voltage Rate of Change (Rated V_R) | dv/dt | 10,000 | $\text{V}/\mu\text{s}$ |
| ESD Ratings: Machine Model = C Human Body Model = 3B | | > 400 > 8000 | V |

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.

1. The heat generated must be less than the thermal conductivity from Junction-to-Ambient: $dP_D/dT_J < 1/R_{\theta JA}$.

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Value | Unit |
|---|------------------------------------|-------------|---------------------------|
| Maximum Thermal Resistance Junction-to-Case Junction-to-Ambient | $R_{\theta JC}$ $R_{\theta JA}$ | 1.9 72.9 | $^\circ\text{C}/\text{W}$ |

ELECTRICAL CHARACTERISTICS (Per Diode Leg)

| Characteristic | Symbol | Value | Unit |
|--|--------|------------------------------|------|
| Maximum Instantaneous Forward Voltage (Note 2) ($I_F = 20\text{ A}$, $T_C = 25^\circ\text{C}$) ($I_F = 20\text{ A}$, $T_C = 125^\circ\text{C}$) ($I_F = 40\text{ A}$, $T_C = 25^\circ\text{C}$) ($I_F = 40\text{ A}$, $T_C = 125^\circ\text{C}$) | V_F | 0.50 0.48 0.63 0.68 | V |
| Maximum Instantaneous Reverse Current (Note 2) (Rated DC Voltage, $T_C = 25^\circ\text{C}$) (Rated DC Voltage, $T_C = 125^\circ\text{C}$) | i_R | 1.2 275 | 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.

2. Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$.

MBR40L45CTG, NRVBB40L45CTT4G

TYPICAL CHARACTERISTICS

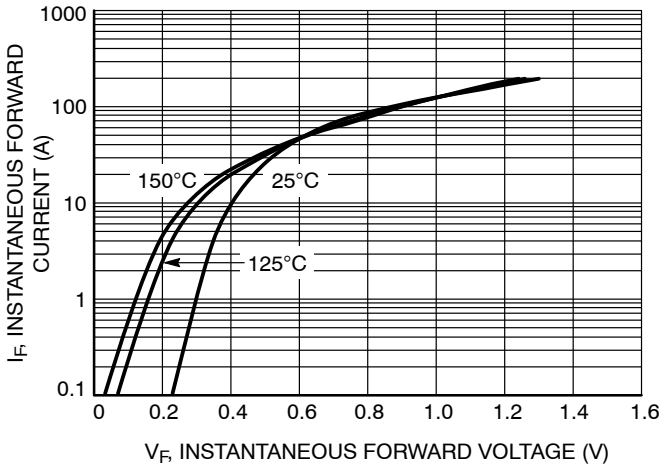


Figure 1. Typical Forward Voltage

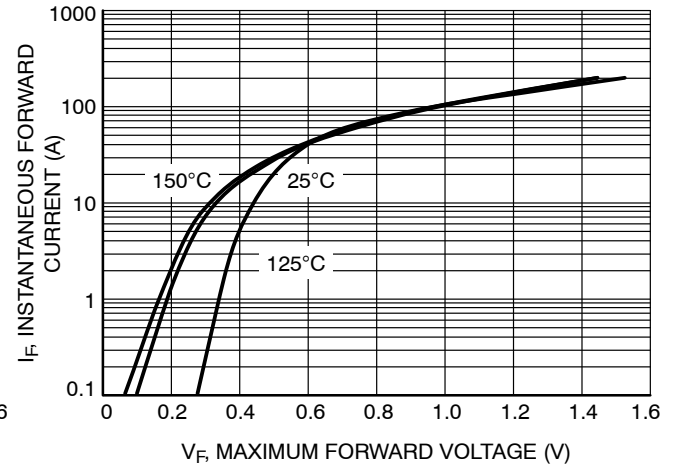


Figure 2. Maximum Forward Voltage

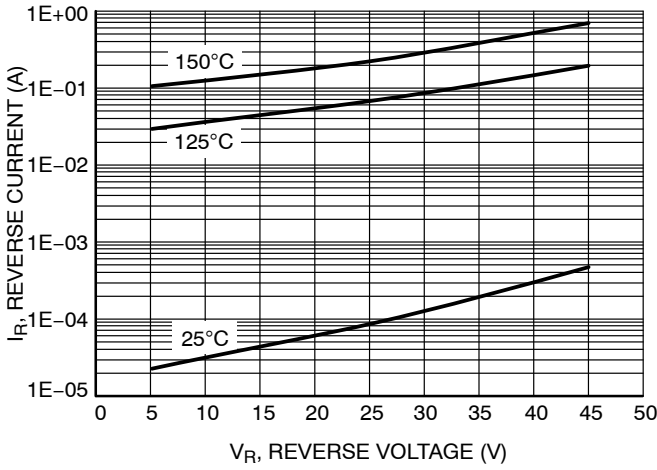


Figure 3. Typical Reverse Current

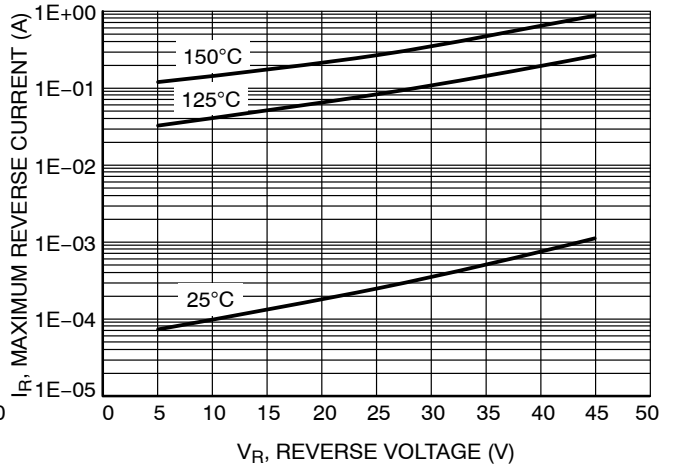


Figure 4. Maximum Reverse Current

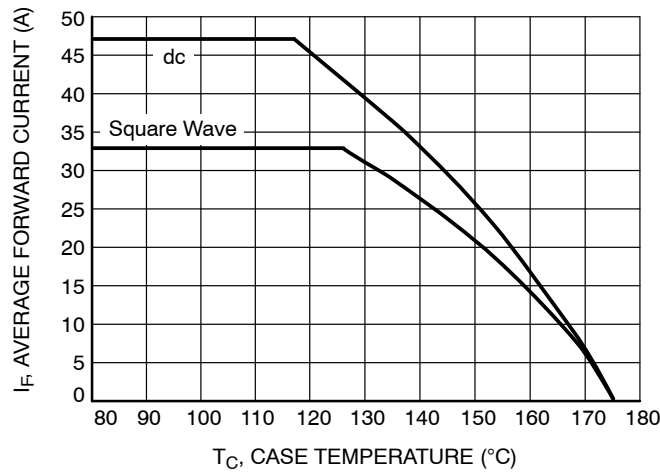


Figure 5. Current Derating for MBR40L45CTG

MBR40L45CTG, NRVBB40L45CTT4G

TYPICAL CHARACTERISTICS

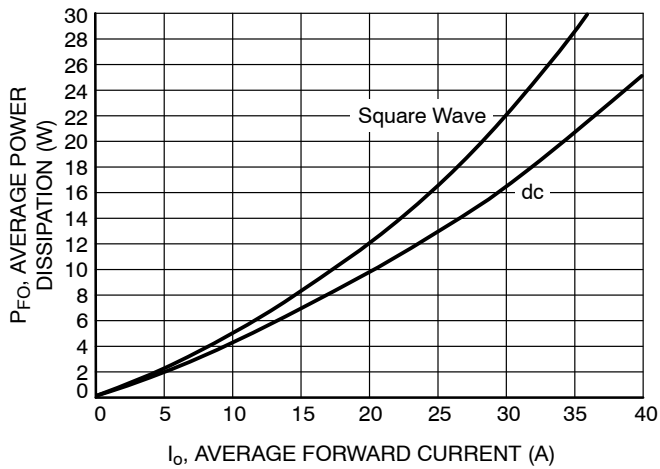


Figure 6. Forward Power Dissipation

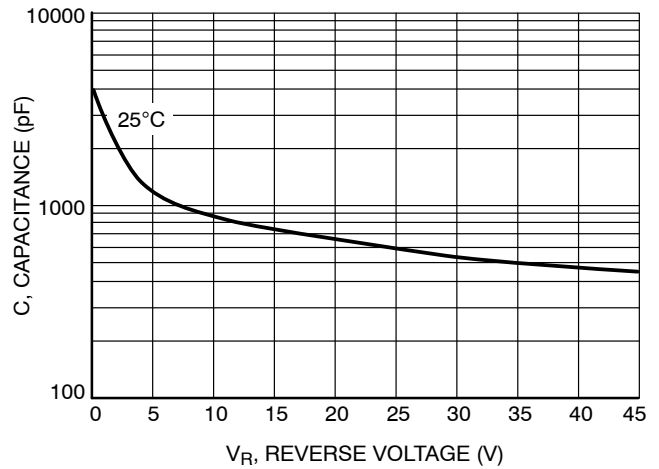


Figure 7. Capacitance

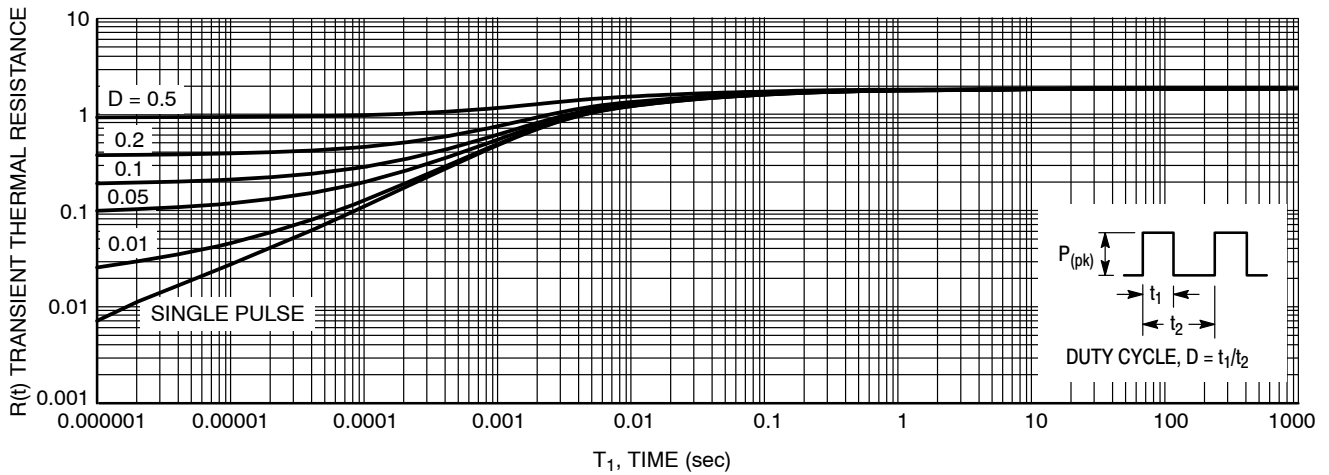
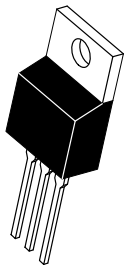
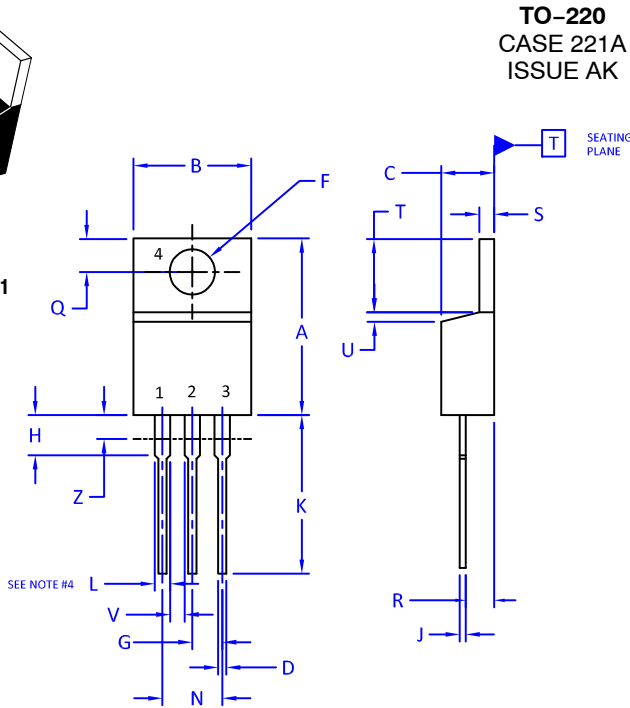


Figure 8. Thermal Response
Junction-to-Case for MBR40L45CTG

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 1:1



TO-220 CASE 221A ISSUE AK

DATE 13 JAN 2022

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 2009.
2. CONTROLLING DIMENSION: INCHES
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.
4. MAX WIDTH FOR F102 DEVICE = 1.35MM

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 0.570 | 0.620 | 14.48 | 15.75 |
| B | 0.380 | 0.415 | 9.66 | 10.53 |
| C | 0.160 | 0.190 | 4.07 | 4.83 |
| D | 0.025 | 0.038 | 0.64 | 0.96 |
| F | 0.142 | 0.161 | 3.60 | 4.09 |
| G | 0.095 | 0.105 | 2.42 | 2.66 |
| H | 0.110 | 0.161 | 2.80 | 4.10 |
| J | 0.014 | 0.024 | 0.36 | 0.61 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| L | 0.045 | 0.060 | 1.15 | 1.52 |
| N | 0.190 | 0.210 | 4.83 | 5.33 |
| Q | 0.100 | 0.120 | 2.54 | 3.04 |
| R | 0.080 | 0.110 | 2.04 | 2.79 |
| S | 0.045 | 0.055 | 1.15 | 1.41 |
| T | 0.235 | 0.255 | 5.97 | 6.47 |
| U | 0.000 | 0.050 | 0.00 | 1.27 |
| V | 0.045 | --- | 1.15 | --- |
| Z | --- | 0.080 | --- | 2.04 |

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

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

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

STYLE 4:
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. MAIN TERMINAL 2

STYLE 5:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 6:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

STYLE 7:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

STYLE 8:
PIN 1. CATHODE
2. ANODE
3. EXTERNAL TRIP/DELAY
4. ANODE

STYLE 9:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 10:
PIN 1. GATE
2. SOURCE
3. DRAIN
4. SOURCE

STYLE 11:
PIN 1. DRAIN
2. SOURCE
3. GATE
4. SOURCE

STYLE 12:
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. NOT CONNECTED

| | | |
|------------------|-------------|--|
| DOCUMENT NUMBER: | 98ASB42148B | 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 | 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.

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

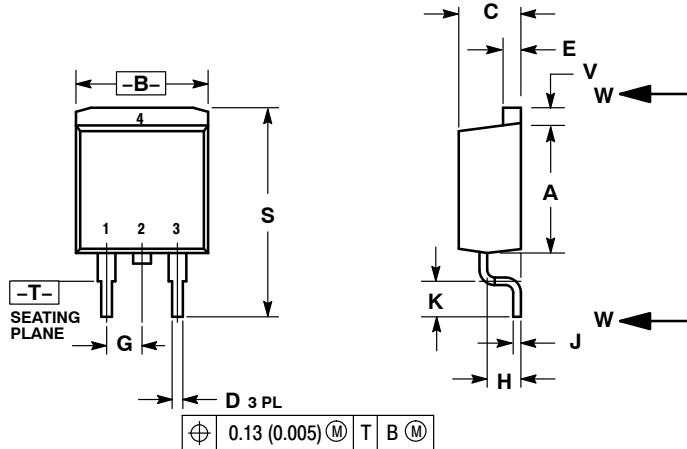
ON Semiconductor®



D²PAK 3
CASE 418B-04
ISSUE L

DATE 17 FEB 2015

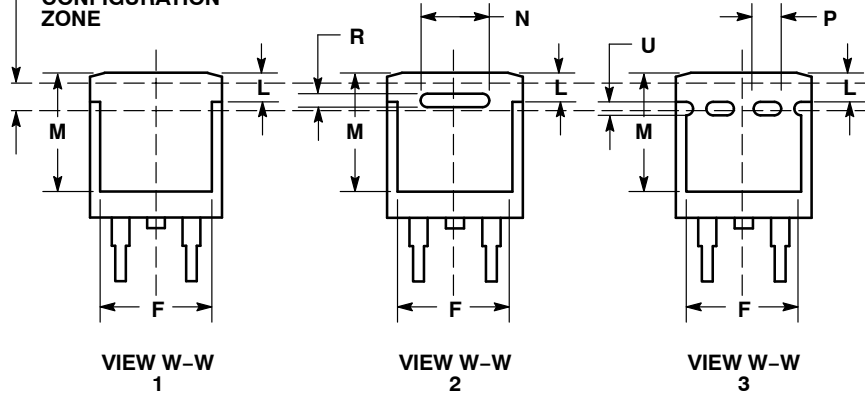
SCALE 1:1



- NOTES:
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 - CONTROLLING DIMENSION: INCH.
 - 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

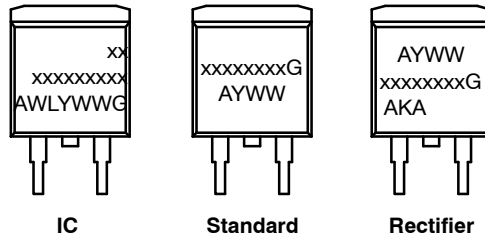
| | | |
|-------------------------|---------------------------|--|
| DOCUMENT NUMBER: | 98ASB42761B | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION: | D²PAK 3 | PAGE 1 OF 2 |

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

D²PAK 3
CASE 418B-04
ISSUE L

DATE 17 FEB 2015

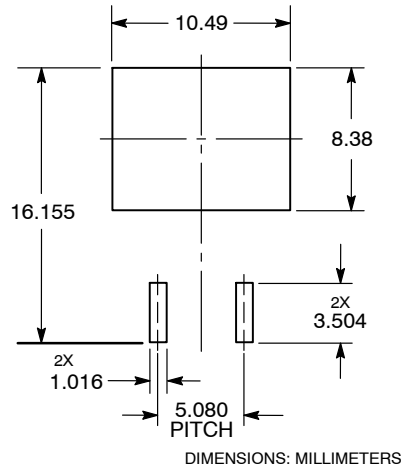
**GENERIC
MARKING DIAGRAM***



- 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.

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor 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: | D²PAK 3 | PAGE 2 OF 2 |

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. ON Semiconductor 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. **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
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales