

# Digital Transistors (BRT)

## $R1 = 2.2 \text{ k}\Omega$ , $R2 = \infty \text{ k}\Omega$

### PNP Transistors with Monolithic Bias Resistor Network

## MUN2138, MMUN2138L, MUN5138, DTA123TE, DTA123TM3, NSBA123TF3

This series of digital transistors is designed to replace a single device and its external resistor bias network. The Bias Resistor Transistor (BRT) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. The BRT eliminates these individual components by integrating them into a single device. The use of a BRT can reduce both system cost and board space.

#### Features

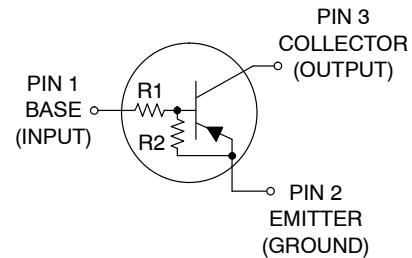
- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

#### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

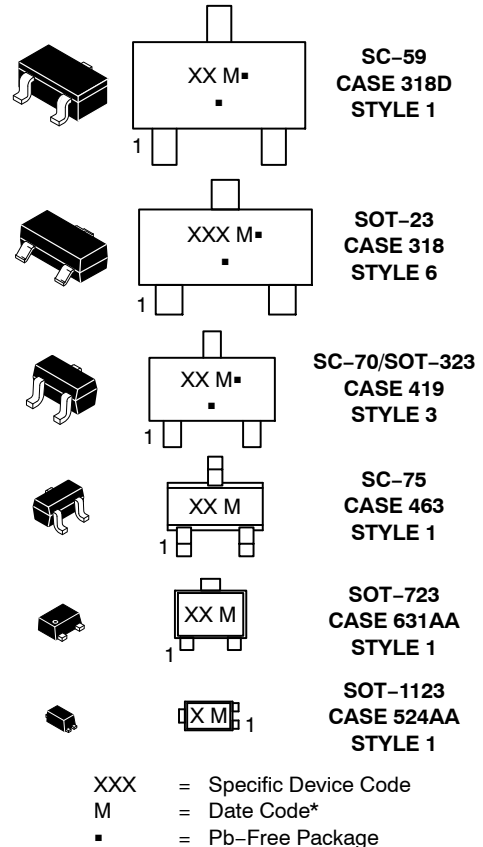
| Rating                         | Symbol        | Max | Unit |
|--------------------------------|---------------|-----|------|
| Collector-Base Voltage         | $V_{CBO}$     | 50  | Vdc  |
| Collector-Emitter Voltage      | $V_{CEO}$     | 50  | Vdc  |
| Collector Current - Continuous | $I_C$         | 100 | mAdc |
| Input Forward Voltage          | $V_{IN(fwd)}$ | 12  | Vdc  |
| Input Reverse Voltage          | $V_{IN(rev)}$ | 5   | Vdc  |

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.

#### PIN CONNECTIONS



#### MARKING DIAGRAMS



(Note: Microdot may be in either location)

\*Date Code orientation may vary depending upon manufacturing location.

#### ORDERING INFORMATION

See detailed ordering, marking, and shipping information on page 2 of this data sheet.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 2.

# MUN2138, MMUN2138L, MUN5138, DTA123TE, DTA123TM3, NSBA123TF3

**Table 1. ORDERING INFORMATION**

| Device                         | Part Marking | Package                    | Shipping <sup>†</sup> |
|--------------------------------|--------------|----------------------------|-----------------------|
| MMUN2138LT1G, NSVMMUN2138LT1G* | ACC          | SOT-23<br>(Pb-Free)        | 3000 / Tape & Reel    |
| MUN5138T1G                     | 6Q           | SC-70/SOT-323<br>(Pb-Free) | 3000 / Tape & Reel    |
| DTA123TET1G                    | 6J           | SC-75<br>(Pb-Free)         | 3000 / Tape & Reel    |
| NSBA123TF3T5G                  | F (90°)**    | SOT-1123<br>(Pb-Free)      | 8000 / Tape & Reel    |

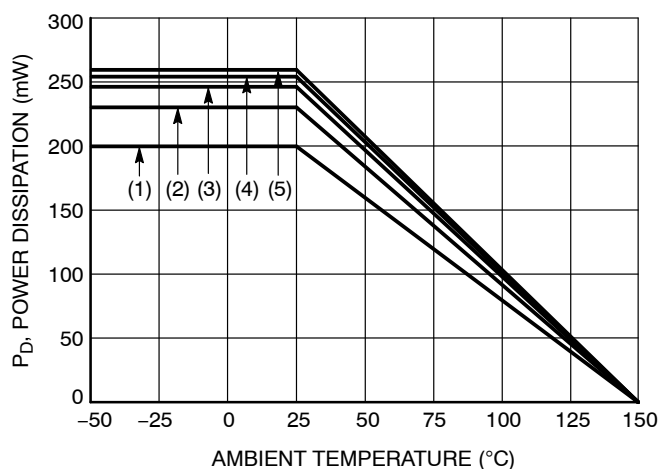
## DISCONTINUED (Note 1)

|              |    |                      |                    |
|--------------|----|----------------------|--------------------|
| MUN2138T1G   | 6V | SC-59<br>(Pb-Free)   | 3000 / Tape & Reel |
| DTA123TM3T5G | 7F | SOT-723<br>(Pb-Free) | 8000 / 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.

\* (xx°) = Degree rotation in the clockwise direction.

1. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on [www.onsemi.com](http://www.onsemi.com).



- (1) SC-75 and SC-70/SOT323; Minimum Pad
- (2) SC-59; Minimum Pad
- (3) SOT-23; Minimum Pad
- (4) SOT-1123; 100 mm², 1 oz. copper trace
- (5) SOT-723; Minimum Pad

**Figure 1. Derating Curve**

Table 2. THERMAL CHARACTERISTICS

| Characteristic                                                                                                        | Symbol          | Max                      | Unit                       |
|-----------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------|----------------------------|
| <b>THERMAL CHARACTERISTICS (SC-59) (MUN2138)</b>                                                                      |                 |                          |                            |
| Total Device Dissipation<br>$T_A = 25^\circ\text{C}$ (Note 2)<br>Derate above $25^\circ\text{C}$ (Note 2)<br>(Note 3) | $P_D$           | 230<br>338<br>1.8<br>2.7 | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance,<br>Junction to Ambient (Note 2)<br>(Note 3)                                                       | $R_{\theta JA}$ | 540<br>370               | $^\circ\text{C/W}$         |
| Thermal Resistance,<br>Junction to Lead (Note 2)<br>(Note 3)                                                          | $R_{\theta JL}$ | 264<br>287               | $^\circ\text{C/W}$         |
| Junction and Storage Temperature Range                                                                                | $T_J, T_{stg}$  | -55 to +150              | $^\circ\text{C}$           |
| <b>THERMAL CHARACTERISTICS (SOT-23) (MMUN2138L)</b>                                                                   |                 |                          |                            |
| Total Device Dissipation<br>$T_A = 25^\circ\text{C}$ (Note 2)<br>Derate above $25^\circ\text{C}$ (Note 2)<br>(Note 3) | $P_D$           | 246<br>400<br>2.0<br>3.2 | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance,<br>Junction to Ambient (Note 1)<br>(Note 3)                                                       | $R_{\theta JA}$ | 508<br>311               | $^\circ\text{C/W}$         |
| Thermal Resistance,<br>Junction to Lead (Note 2)<br>(Note 3)                                                          | $R_{\theta JL}$ | 174<br>208               | $^\circ\text{C/W}$         |
| Junction and Storage Temperature Range                                                                                | $T_J, T_{stg}$  | -55 to +150              | $^\circ\text{C}$           |
| <b>THERMAL CHARACTERISTICS (SC-70/SOT-323) (MUN5138)</b>                                                              |                 |                          |                            |
| Total Device Dissipation<br>$T_A = 25^\circ\text{C}$ (Note 2)<br>Derate above $25^\circ\text{C}$ (Note 2)<br>(Note 3) | $P_D$           | 202<br>310<br>1.6<br>2.5 | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance,<br>Junction to Ambient (Note 2)<br>(Note 3)                                                       | $R_{\theta JA}$ | 618<br>403               | $^\circ\text{C/W}$         |
| Thermal Resistance,<br>Junction to Lead (Note 2)<br>(Note 3)                                                          | $R_{\theta JL}$ | 280<br>332               | $^\circ\text{C/W}$         |
| Junction and Storage Temperature Range                                                                                | $T_J, T_{stg}$  | -55 to +150              | $^\circ\text{C}$           |
| <b>THERMAL CHARACTERISTICS (SC-75) (DTA123TE)</b>                                                                     |                 |                          |                            |
| Total Device Dissipation<br>$T_A = 25^\circ\text{C}$ (Note 2)<br>Derate above $25^\circ\text{C}$ (Note 2)<br>(Note 3) | $P_D$           | 200<br>300<br>1.6<br>2.4 | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance,<br>Junction to Ambient (Note 2)<br>(Note 3)                                                       | $R_{\theta JA}$ | 600<br>400               | $^\circ\text{C/W}$         |
| Junction and Storage Temperature Range                                                                                | $T_J, T_{stg}$  | -55 to +150              | $^\circ\text{C}$           |
| <b>THERMAL CHARACTERISTICS (SOT-723) (DTA123TM3)</b>                                                                  |                 |                          |                            |
| Total Device Dissipation<br>$T_A = 25^\circ\text{C}$ (Note 2)<br>Derate above $25^\circ\text{C}$ (Note 2)<br>(Note 3) | $P_D$           | 260<br>600<br>2.0<br>4.8 | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance,<br>Junction to Ambient (Note 2)<br>(Note 3)                                                       | $R_{\theta JA}$ | 480<br>205               | $^\circ\text{C/W}$         |

2. FR-4 @ Minimum Pad.

3. FR-4 @ 1.0 x 1.0 Inch Pad.

4. FR-4 @ 100 mm<sup>2</sup>, 1 oz. copper traces, still air.

5. FR-4 @ 500 mm<sup>2</sup>, 1 oz. copper traces, still air.

# MUN2138, MMUN2138L, MUN5138, DTA123TE, DTA123TM3, NSBA123TF3

**Table 2. THERMAL CHARACTERISTICS**

| Characteristic                                                | Symbol          | Max         | Unit  |
|---------------------------------------------------------------|-----------------|-------------|-------|
| <b>THERMAL CHARACTERISTICS (SOT-723) (DTA123TM3)</b>          |                 |             |       |
| Junction and Storage Temperature Range                        | $T_J, T_{stg}$  | -55 to +150 | °C    |
| <b>THERMAL CHARACTERISTICS (SOT-1123) (NSBA123TF3)</b>        |                 |             |       |
| Total Device Dissipation<br>$T_A = 25^\circ\text{C}$ (Note 4) | $P_D$           | 254         | mW    |
| Derate above $25^\circ\text{C}$ (Note 5)                      |                 | 297         | mW/°C |
| (Note 4)                                                      |                 | 2.0         |       |
| (Note 5)                                                      |                 | 2.4         |       |
| Thermal Resistance, Junction to Ambient (Note 4)              | $R_{\theta JA}$ | 493         | °C/W  |
| (Note 5)                                                      |                 | 421         |       |
| Thermal Resistance, Junction to Lead (Note 4)                 | $R_{\theta JL}$ | 193         | °C/W  |
| Junction and Storage Temperature Range                        | $T_J, T_{stg}$  | -55 to +150 | °C    |

2. FR-4 @ Minimum Pad.
3. FR-4 @ 1.0 x 1.0 Inch Pad.
4. FR-4 @ 100 mm<sup>2</sup>, 1 oz. copper traces, still air.
5. FR-4 @ 500 mm<sup>2</sup>, 1 oz. copper traces, still air.

**Table 3. ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)

| Characteristic                                                                                    | Symbol        | Min | Typ | Max  | Unit       |
|---------------------------------------------------------------------------------------------------|---------------|-----|-----|------|------------|
| <b>OFF CHARACTERISTICS</b>                                                                        |               |     |     |      |            |
| Collector-Base Cutoff Current<br>( $V_{CB} = 50\text{ V}, I_E = 0$ )                              | $I_{CBO}$     | -   | -   | 100  | nAdc       |
| Collector-Emitter Cutoff Current<br>( $V_{CE} = 50\text{ V}, I_B = 0$ )                           | $I_{CEO}$     | -   | -   | 500  | nAdc       |
| Emitter-Base Cutoff Current<br>( $V_{EB} = 6.0\text{ V}, I_C = 0$ )                               | $I_{EBO}$     | -   | -   | 4.0  | mAdc       |
| Collector-Base Breakdown Voltage<br>( $I_C = 10\text{ }\mu\text{A}, I_E = 0$ )                    | $V_{(BR)CBO}$ | 50  | -   | -    | Vdc        |
| Collector-Emitter Breakdown Voltage (Note 6)<br>( $I_C = 2.0\text{ mA}, I_B = 0$ )                | $V_{(BR)CEO}$ | 50  | -   | -    | Vdc        |
| <b>ON CHARACTERISTICS</b>                                                                         |               |     |     |      |            |
| DC Current Gain (Note 6)<br>( $I_C = 5.0\text{ mA}, V_{CE} = 10\text{ V}$ )                       | $h_{FE}$      | 160 | 350 | -    |            |
| Collector-Emitter Saturation Voltage (Note 6)<br>( $I_C = 10\text{ mA}, I_B = 0.3\text{ mA}$ )    | $V_{CE(sat)}$ | -   | -   | 0.25 | Vdc        |
| Input Voltage (off)<br>( $V_{CE} = 5.0\text{ V}, I_C = 100\text{ }\mu\text{A}$ )                  | $V_{i(off)}$  | -   | 0.6 | 0.5  | Vdc        |
| Input Voltage (on)<br>( $V_{CE} = 0.3\text{ V}, I_C = 10\text{ mA}$ )                             | $V_{i(on)}$   | 1.3 | 0.9 | -    | Vdc        |
| Output Voltage (on)<br>( $V_{CC} = 5.0\text{ V}, V_B = 2.5\text{ V}, R_L = 1.0\text{ k}\Omega$ )  | $V_{OL}$      | -   | -   | 0.2  | Vdc        |
| Output Voltage (off)<br>( $V_{CC} = 5.0\text{ V}, V_B = 0.5\text{ V}, R_L = 1.0\text{ k}\Omega$ ) | $V_{OH}$      | 4.9 | -   | -    | Vdc        |
| Input Resistor                                                                                    | $R_1$         | 1.5 | 2.2 | 2.9  | k $\Omega$ |
| Resistor Ratio                                                                                    | $R_1/R_2$     | -   | -   | -    |            |

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.

6. Pulsed Condition: Pulse Width = 300 msec, Duty Cycle  $\leq 2\%$ .

TYPICAL CHARACTERISTICS,  
MUN2138, MMUN2138L, MUN5138, DTA123TE, DTA123TM3, NSBA123TF3

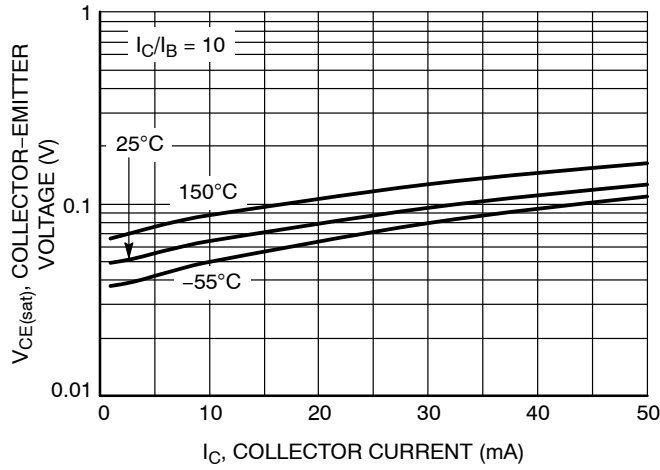


Figure 2.  $V_{CE(sat)}$  vs.  $I_C$

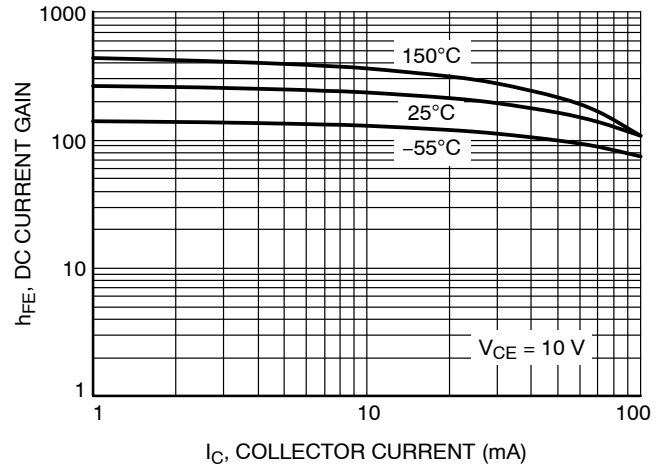


Figure 3. DC Current Gain

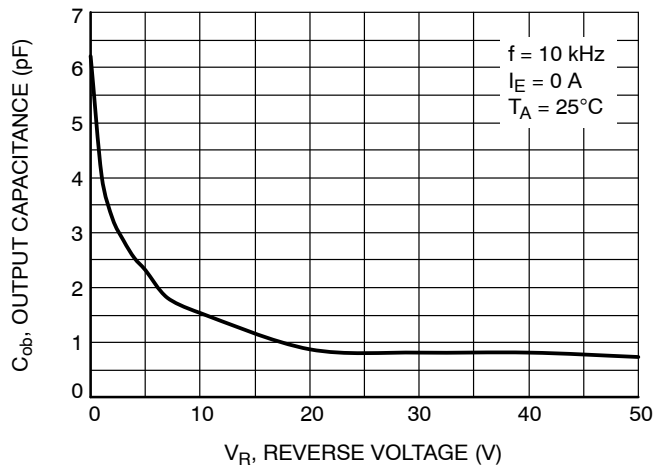


Figure 4. Output Capacitance

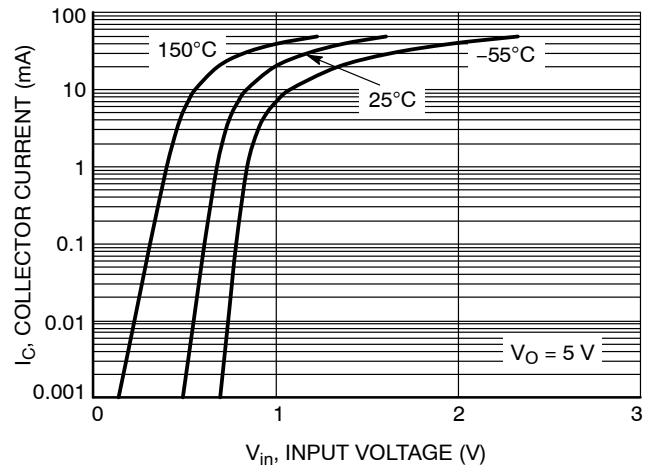


Figure 5. Output Current vs. Input Voltage

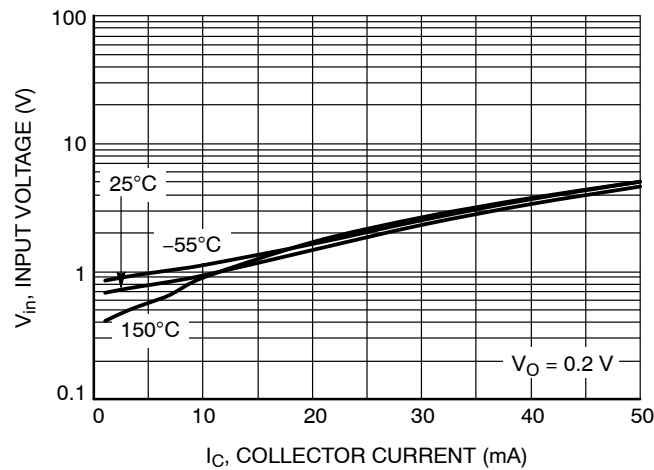
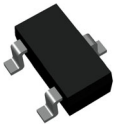


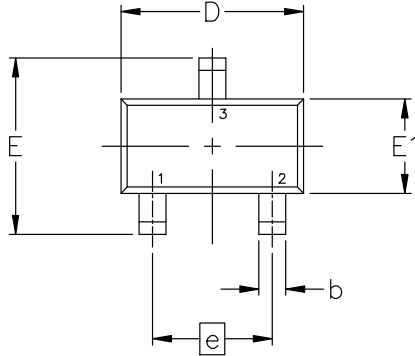
Figure 6. Input Voltage vs. Output Current

PACKAGE DIMENSIONS

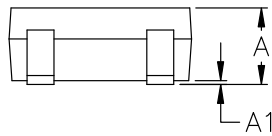


SC-59-3 2.90x1.50x1.15, 1.90P  
CASE 318D  
ISSUE J

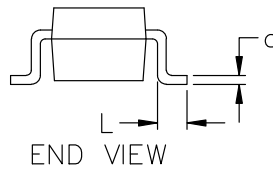
DATE 15 FEB 2024



TOP VIEW



SIDE VIEW

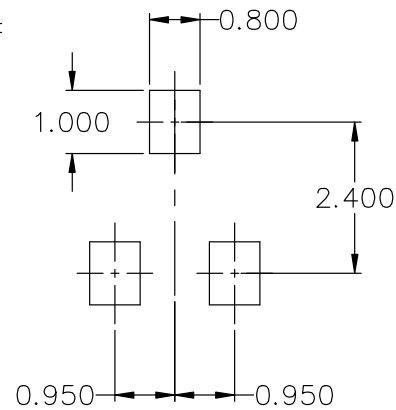


END VIEW

NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
2. ALL DIMENSION ARE IN MILLIMETERS.

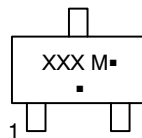
| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 1.00        | 1.15 | 1.30 |
| A1  | 0.01        | 0.06 | 0.10 |
| b   | 0.35        | 0.43 | 0.50 |
| c   | 0.09        | 0.14 | 0.18 |
| D   | 2.70        | 2.90 | 3.10 |
| E   | 2.50        | 2.80 | 3.00 |
| E1  | 1.30        | 1.50 | 1.70 |
| e   | 1.90 BSC    |      |      |
| L   | 0.20        | 0.40 | 0.60 |



RECOMMENDED MOUNTING 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.

GENERIC MARKING DIAGRAM\*



- XXX = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package\*

(Note: Microdot may be in either location)

\*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.

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

STYLE 2:  
PIN 1. ANODE  
2. N.C.  
3. CATHODE

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

STYLE 4:  
PIN 1. CATHODE  
2. N.C.  
3. ANODE

STYLE 5:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE

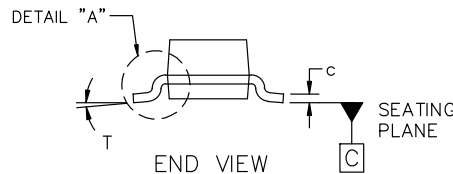
STYLE 6:  
PIN 1. ANODE  
2. CATHODE  
3. ANODE/CATHODE



SCALE 4:1

SOT-23 (TO-236) 2.90x1.30x1.00 1.90P  
CASE 318  
ISSUE AU

DATE 14 AUG 2024

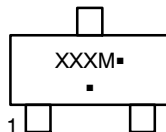


| MILLIMETERS |      |      |      |
|-------------|------|------|------|
| DIM         | MIN  | NOM  | MAX  |
| A           | 0.89 | 1.00 | 1.11 |
| A1          | 0.01 | 0.06 | 0.10 |
| b           | 0.37 | 0.44 | 0.50 |
| c           | 0.08 | 0.14 | 0.20 |
| D           | 2.80 | 2.90 | 3.04 |
| E           | 1.20 | 1.30 | 1.40 |
| e           | 1.78 | 1.90 | 2.04 |
| L           | 0.30 | 0.43 | 0.55 |
| L1          | 0.35 | 0.54 | 0.69 |
| HE          | 2.10 | 2.40 | 2.64 |
| T           | 0°   | ---  | 10°  |

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

GENERIC  
MARKING DIAGRAM\*



XXX = Specific Device Code  
M = Date Code  
▪ = 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. Some products may not follow the Generic Marking.



RECOMMENDED  
MOUNTING FOOTPRINT

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

STYLES ON PAGE 2

|                  |                                      |                                                                                                                                                                                     |
|------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DOCUMENT NUMBER: | 98ASB42226B                          | 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:     | SOT-23 (TO-236) 2.90x1.30x1.00 1.90P | 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.

**SOT-23 (TO-236) 2.90x1.30x1.00 1.90P**  
**CASE 318**  
**ISSUE AU**

DATE 14 AUG 2024

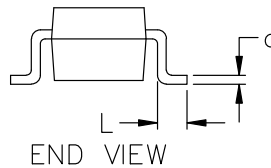
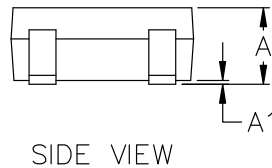
|                                                         |                                                       |                                                             |                                                             |                                                             |                                                             |
|---------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|
| STYLE 1 THRU 5:<br>CANCELLED                            | STYLE 6:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 7:<br>PIN 1. EMITTER<br>2. BASE<br>3. COLLECTOR       | STYLE 8:<br>PIN 1. ANODE<br>2. NO CONNECTION<br>3. CATHODE  |                                                             |                                                             |
| STYLE 9:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE      | STYLE 10:<br>PIN 1. DRAIN<br>2. SOURCE<br>3. GATE     | STYLE 11:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE-ANODE | STYLE 12:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE       | STYLE 13:<br>PIN 1. SOURCE<br>2. DRAIN<br>3. GATE           | STYLE 14:<br>PIN 1. CATHODE<br>2. GATE<br>3. ANODE          |
| STYLE 15:<br>PIN 1. GATE<br>2. CATHODE<br>3. ANODE      | STYLE 16:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE | STYLE 17:<br>PIN 1. NO CONNECTION<br>2. ANODE<br>3. CATHODE | STYLE 18:<br>PIN 1. NO CONNECTION<br>2. CATHODE<br>3. ANODE | STYLE 19:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE-ANODE | STYLE 20:<br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE          |
| STYLE 21:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN       | STYLE 22:<br>PIN 1. RETURN<br>2. OUTPUT<br>3. INPUT   | STYLE 23:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE         | STYLE 24:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE           | STYLE 25:<br>PIN 1. ANODE<br>2. CATHODE<br>3. GATE          | STYLE 26:<br>PIN 1. CATHODE<br>2. ANODE<br>3. NO CONNECTION |
| STYLE 27:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. CATHODE | STYLE 28:<br>PIN 1. ANODE<br>2. ANODE<br>3. ANODE     |                                                             |                                                             |                                                             |                                                             |

|                  |                                      |                                                                                                                                                                                     |
|------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DOCUMENT NUMBER: | 98ASB42226B                          | 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:     | SOT-23 (TO-236) 2.90x1.30x1.00 1.90P | 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.


**SC-59-3 2.90x1.50x1.15, 1.90P**  
**CASE 318D**  
**ISSUE J**

DATE 15 FEB 2024



## NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
2. ALL DIMENSION ARE IN MILLIMETERS.

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 1.00        | 1.15 | 1.30 |
| A1  | 0.01        | 0.06 | 0.10 |
| b   | 0.35        | 0.43 | 0.50 |
| c   | 0.09        | 0.14 | 0.18 |
| D   | 2.70        | 2.90 | 3.10 |
| E   | 2.50        | 2.80 | 3.00 |
| E1  | 1.30        | 1.50 | 1.70 |
| e   | 1.90 BSC    |      |      |
| L   | 0.20        | 0.40 | 0.60 |


**GENERIC**  
**MARKING DIAGRAM\***


XXX = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package\*

(\*Note: Microdot may be in either location)

\*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.

\* FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

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

STYLE 2:  
PIN 1. ANODE  
2. N.C.  
3. CATHODE

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

STYLE 4:  
PIN 1. CATHODE  
2. N.C.  
3. ANODE

STYLE 5:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE

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

|                         |                                      |                                                                                                                                                                                  |
|-------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DOCUMENT NUMBER:</b> | <b>98ASB42664B</b>                   | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| <b>DESCRIPTION:</b>     | <b>SC-59-3 2.90x1.50x1.15, 1.90P</b> | <b>PAGE 1 OF 1</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.



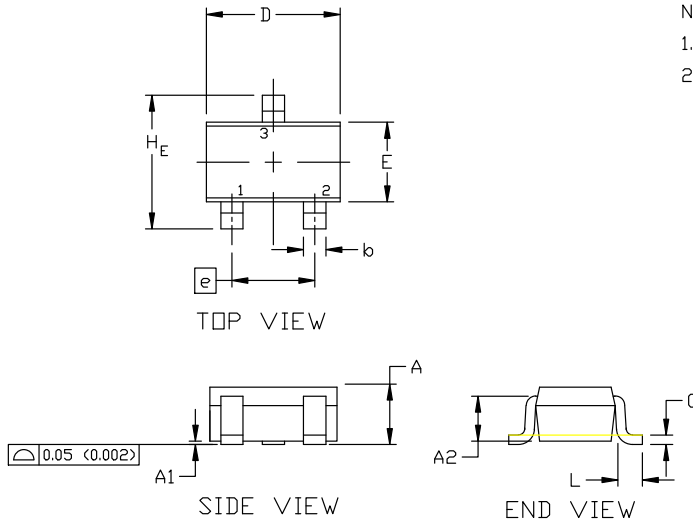
SCALE 4:1

**SC-70 (SOT-323)**  
**CASE 419**  
**ISSUE R**

DATE 11 OCT 2022

## NOTES:

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



| DIM | MILLIMETERS |      |      | INCHES    |       |       |
|-----|-------------|------|------|-----------|-------|-------|
|     | MIN.        | NOM. | MAX. | MIN.      | NOM.  | MAX.  |
| A   | 0.80        | 0.90 | 1.00 | 0.032     | 0.035 | 0.040 |
| A1  | 0.00        | 0.05 | 0.10 | 0.000     | 0.002 | 0.004 |
| A2  | 0.70 REF    |      |      | 0.028 BSC |       |       |
| b   | 0.30        | 0.35 | 0.40 | 0.012     | 0.014 | 0.016 |
| c   | 0.10        | 0.18 | 0.25 | 0.004     | 0.007 | 0.010 |
| D   | 1.80        | 2.00 | 2.20 | 0.071     | 0.080 | 0.087 |
| E   | 1.15        | 1.24 | 1.35 | 0.045     | 0.049 | 0.053 |
| e   | 1.20        | 1.30 | 1.40 | 0.047     | 0.051 | 0.055 |
| e1  | 0.65 BSC    |      |      | 0.026 BSC |       |       |
| L   | 0.20        | 0.38 | 0.56 | 0.008     | 0.015 | 0.022 |
| H_E | 2.00        | 2.10 | 2.40 | 0.079     | 0.083 | 0.095 |

**GENERIC  
MARKING DIAGRAM**


XX = Specific Device Code  
M = Date Code  
■ = 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. Some products may not follow the Generic Marking.



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

**SOLDERING FOOTPRINT**

STYLE 1:  
CANCELLED

STYLE 2:  
PIN 1. ANODE  
2. N.C.  
3. CATHODE

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

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

STYLE 5:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 6:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

STYLE 7:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

STYLE 8:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN

STYLE 9:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE-ANODE

STYLE 10:  
PIN 1. CATHODE  
2. ANODE  
3. ANODE-CATHODE

STYLE 11:  
PIN 1. CATHODE  
2. CATHODE  
3. CATHODE

|                         |                        |                                                                                                                                                                                  |
|-------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DOCUMENT NUMBER:</b> | <b>98ASB42819B</b>     | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| <b>DESCRIPTION:</b>     | <b>SC-70 (SOT-323)</b> | <b>PAGE 1 OF 1</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.

**SC75-3 1.60x0.80x0.80, 1.00P**  
**CASE 463**  
**ISSUE H**

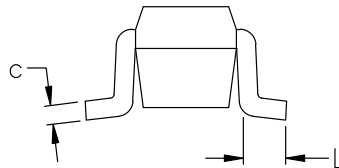
DATE 01 FEB 2024



TOP VIEW



SIDE VIEW



END VIEW

**GENERIC MARKING DIAGRAM\***



XX = Specific Device Code  
M = Date Code  
▪ = 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. Some products may not follow the Generic Marking.

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

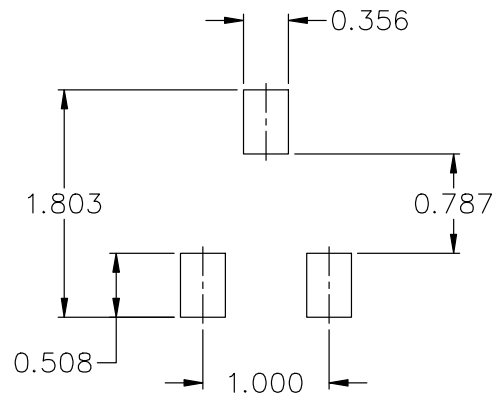
STYLE 2:  
PIN 1. ANODE  
2. N/C  
3. CATHODE

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

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

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

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 0.70        | 0.80 | 0.90 |
| A1  | 0.00        | 0.05 | 0.10 |
| A2  | 0.80 REF.   |      |      |
| b   | 0.15        | 0.20 | 0.30 |
| c   | 0.10        | 0.15 | 0.25 |
| D   | 1.55        | 1.60 | 1.65 |
| E   | 1.50        | 1.60 | 1.70 |
| E1  | 0.70        | 0.80 | 0.90 |
| e   | 1.00 BSC    |      |      |
| L   | 0.10        | 0.15 | 0.20 |

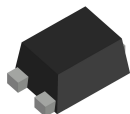


**RECOMMENDED MOUNTING FOOTPRINT\***

\* FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

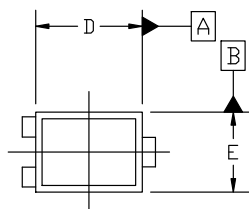
|                         |                                     |                                                                                                                                                                                  |
|-------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DOCUMENT NUMBER:</b> | <b>98ASB15184C</b>                  | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| <b>DESCRIPTION:</b>     | <b>SC75-3 1.60x0.80x0.80, 1.00P</b> | <b>PAGE 1 OF 1</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.

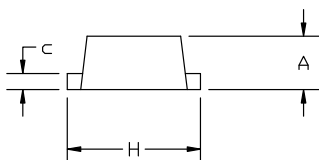


**SOT-1123 0.80x0.60x0.37, 0.35P**  
**CASE 524AA**  
**ISSUE D**

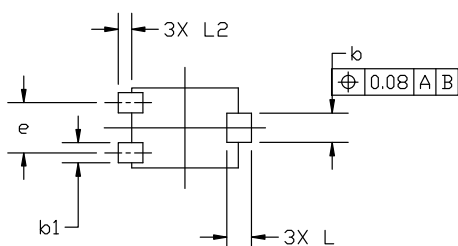
DATE 18 JAN 2024



TOP VIEW

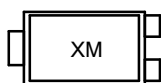


SIDE VIEW



BOTTOM VIEW

**GENERIC  
MARKING DIAGRAM\***



X = Specific Device Code  
M = Date Code

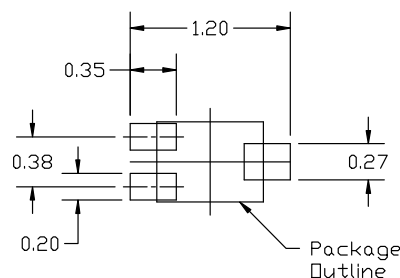
\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

MILLIMETERS

| DIM | MIN       | NOM   | MAX   |
|-----|-----------|-------|-------|
| A   | 0.34      | 0.37  | 0.40  |
| b   | 0.15      | 0.22  | 0.28  |
| b1  | 0.10      | 0.15  | 0.20  |
| c   | 0.07      | 0.12  | 0.17  |
| D   | 0.75      | 0.80  | 0.85  |
| E   | 0.55      | 0.60  | 0.65  |
| e   | 0.35      | 0.38  | 0.40  |
| H   | 0.950     | 1.000 | 1.050 |
| L   | 0.185 REF |       |       |
| L2  | 0.05      | 0.10  | 0.15  |



**RECOMMENDED  
MOUNTING FOOTPRINT**

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference manual, SOLDERM/D.

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

STYLE 2:  
PIN 1. ANODE  
2. N/C  
3. CATHODE

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

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

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

|                         |                                       |                                                                                                                                                                                  |
|-------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DOCUMENT NUMBER:</b> | <b>98AON23134D</b>                    | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| <b>DESCRIPTION:</b>     | <b>SOT-1123 0.80x0.60x0.37, 0.35P</b> | <b>PAGE 1 OF 1</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.



**SOT-723 1.20x0.80x0.50, 0.40P**  
**CASE 631AA**  
**ISSUE E**

DATE 24 JAN 2024

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.



TOP VIEW



SIDE VIEW



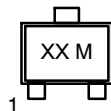
BOTTOM VIEW

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 0.45        | 0.50 | 0.55 |
| b   | 0.15        | 0.21 | 0.27 |
| b1  | 0.25        | 0.31 | 0.37 |
| c   | 0.07        | 0.12 | 0.17 |
| D   | 1.15        | 1.20 | 1.25 |
| E   | 0.75        | 0.80 | 0.85 |
| e   | 0.40 BSC    |      |      |
| H   | 1.15        | 1.20 | 1.25 |
| L   | 0.29 REF    |      |      |
| L2  | 0.15        | 0.20 | 0.25 |



RECOMMENDED MOUNTING  
FOOTPRINT

**GENERIC  
MARKING DIAGRAM\***



XX = Specific Device Code  
M = Date Code

\*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.

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

|                                                       |                                                  |                                                    |                                                      |                                                  |
|-------------------------------------------------------|--------------------------------------------------|----------------------------------------------------|------------------------------------------------------|--------------------------------------------------|
| STYLE 1:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 2:<br>PIN 1. ANODE<br>2. N/C<br>3. CATHODE | STYLE 3:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE | STYLE 4:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE | STYLE 5:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN |
|-------------------------------------------------------|--------------------------------------------------|----------------------------------------------------|------------------------------------------------------|--------------------------------------------------|

|                         |                                      |                                                                                                                                                                                  |
|-------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DOCUMENT NUMBER:</b> | <b>98AON12989D</b>                   | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| <b>DESCRIPTION:</b>     | <b>SOT-723 1.20x0.80x0.50, 0.40P</b> | <b>PAGE 1 OF 1</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)