

# UMZ1NT1G

## Complementary Dual General Purpose Amplifier Transistor

### PNP and NPN Surface Mount

#### Features

- High Voltage and High Current:  $V_{CEO} = 50\text{ V}$ ,  $I_C = 200\text{ mA}$
- High  $h_{FE}$ :  $h_{FE} = 200 \sim 400$
- Moisture Sensitivity Level: 1
- ESD Rating – Human Body Model: 3A  
– Machine Model: C
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

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

| Rating                         | Symbol        | Value | Unit |
|--------------------------------|---------------|-------|------|
| Collector-Base Voltage         | $V_{(BR)CBO}$ | 60    | Vdc  |
| Collector-Emitter Voltage      | $V_{(BR)CEO}$ | 50    | Vdc  |
| Emitter-Base Voltage           | $V_{(BR)EBO}$ | 7.0   | Vdc  |
| Collector Current – Continuous | $I_C$         | 200   | mAdc |

#### THERMAL CHARACTERISTICS

| Characteristic<br>(One Junction Heated)                                                 | Symbol          | Max                                                          | Unit                       |
|-----------------------------------------------------------------------------------------|-----------------|--------------------------------------------------------------|----------------------------|
| Total Device Dissipation<br>$T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 187 (Note 1)<br>256 (Note 2)<br>1.5 (Note 1)<br>2.0 (Note 2) | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient                                                 | $R_{\theta JA}$ | 670 (Note 1)<br>490 (Note 2)                                 | $^\circ\text{C/W}$         |
| Characteristic<br>(Both Junctions Heated)                                               | Symbol          | Max                                                          | Unit                       |
| Total Device Dissipation<br>$T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 250 (Note 1)<br>385 (Note 2)<br>2.0 (Note 1)<br>3.0 (Note 2) | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient                                                 | $R_{\theta JA}$ | 493 (Note 1)<br>325 (Note 2)                                 | $^\circ\text{C/W}$         |
| Thermal Resistance, Junction-to-Lead                                                    | $R_{\theta JL}$ | 188 (Note 1)<br>208 (Note 2)                                 | $^\circ\text{C/W}$         |
| Junction and Storage Temperature                                                        | $T_J, T_{stg}$  | -55 to +150                                                  | $^\circ\text{C}$           |

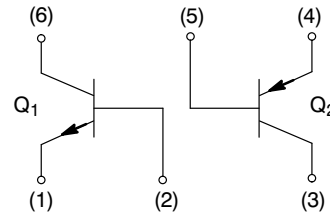
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-4 @ Minimum Pad
2. FR-4 @ 1.0 x 1.0 inch Pad



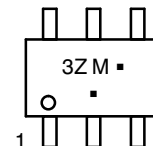
ON Semiconductor®

<http://onsemi.com>



SC-88  
CASE 419B

#### MARKING DIAGRAM



3Z = Device Code  
M = Date Code  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

#### ORDERING INFORMATION

| Device*  | Package            | Shipping†             |
|----------|--------------------|-----------------------|
| UMZ1NT1G | SC-88<br>(Pb-Free) | 3000 /<br>Tape & Reel |

\*The "T1" suffix refers to a 7 inch reel.

†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.

# UMZ1NT1G

## Q1: NPN

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

| Characteristic                                                                                                                                                                                  | Symbol        | Min         | Typ         | Max               | Unit                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------|-------------|-------------------|--------------------------------------|
| Collector–Emitter Breakdown Voltage<br>( $I_C = 2.0\text{ mA}$ , $I_B = 0$ )                                                                                                                    | $V_{(BR)CEO}$ | 50          | –           | –                 | Vdc                                  |
| Collector–Base Breakdown Voltage<br>( $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ )                                                                                                               | $V_{(BR)CBO}$ | 60          | –           | –                 | Vdc                                  |
| Emitter–Base Breakdown Voltage<br>( $I_E = 10\text{ }\mu\text{A}$ , $I_C = 0$ )                                                                                                                 | $V_{(BR)EBO}$ | 7.0         | –           | –                 | Vdc                                  |
| Collector–Base Cutoff Current<br>( $V_{CB} = 45\text{ Vdc}$ , $I_E = 0$ )                                                                                                                       | $I_{CBO}$     | –           | –           | 0.1               | $\mu\text{A}$                        |
| Collector–Emitter Cutoff Current<br>( $V_{CE} = 10\text{ Vdc}$ , $I_B = 0$ )<br>( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ )<br>( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ , $T_A = 80^\circ\text{C}$ ) | $I_{CEO}$     | –<br>–<br>– | –<br>–<br>– | 0.1<br>2.0<br>1.0 | $\mu\text{A}$<br>$\mu\text{A}$<br>mA |
| DC Current Gain (Note 3)<br>( $V_{CE} = 6.0\text{ Vdc}$ , $I_C = 2.0\text{ mA}$ )                                                                                                               | $h_{FE}$      | 200         | –           | 400               | –                                    |
| Collector–Emitter Saturation Voltage<br>( $I_C = 100\text{ mA}$ , $I_B = 10\text{ mA}$ )                                                                                                        | $V_{CE(sat)}$ | –           | –           | 0.25              | Vdc                                  |
| Transistor Frequency                                                                                                                                                                            | $f_T$         | –           | 114         | –                 | MHz                                  |

3. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , D.C.  $\leq 2\%$ .

## Q2: PNP

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

| Characteristic                                                                                                                                                                                  | Symbol        | Min         | Typ         | Max                  | Unit                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------|-------------|----------------------|--------------------------------------|
| Collector–Emitter Breakdown Voltage<br>( $I_C = 2.0\text{ mA}$ , $I_B = 0$ )                                                                                                                    | $V_{(BR)CEO}$ | –50         | –           | –                    | Vdc                                  |
| Collector–Base Breakdown Voltage<br>( $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ )                                                                                                               | $V_{(BR)CBO}$ | –60         | –           | –                    | Vdc                                  |
| Emitter–Base Breakdown Voltage<br>( $I_E = 10\text{ }\mu\text{A}$ , $I_C = 0$ )                                                                                                                 | $V_{(BR)EBO}$ | –7.0        | –           | –                    | Vdc                                  |
| Collector–Base Cutoff Current<br>( $V_{CB} = 45\text{ Vdc}$ , $I_E = 0$ )                                                                                                                       | $I_{CBO}$     | –           | –           | –0.1                 | $\mu\text{A}$                        |
| Collector–Emitter Cutoff Current<br>( $V_{CE} = 10\text{ Vdc}$ , $I_B = 0$ )<br>( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ )<br>( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ , $T_A = 80^\circ\text{C}$ ) | $I_{CEO}$     | –<br>–<br>– | –<br>–<br>– | –0.1<br>–2.0<br>–1.0 | $\mu\text{A}$<br>$\mu\text{A}$<br>mA |
| DC Current Gain (Note 3)<br>( $V_{CE} = 6.0\text{ Vdc}$ , $I_C = 2.0\text{ mA}$ )                                                                                                               | $h_{FE}$      | 200         | –           | 400                  | –                                    |
| Collector–Emitter Saturation Voltage<br>( $I_C = 100\text{ mA}$ , $I_B = 10\text{ mA}$ )                                                                                                        | $V_{CE(sat)}$ | –           | –           | –0.3                 | Vdc                                  |
| Transistor Frequency                                                                                                                                                                            | $f_T$         | –           | 142         | –                    | MHz                                  |

TYPICAL ELECTRICAL CHARACTERISTICS: PNP TRANSISTOR

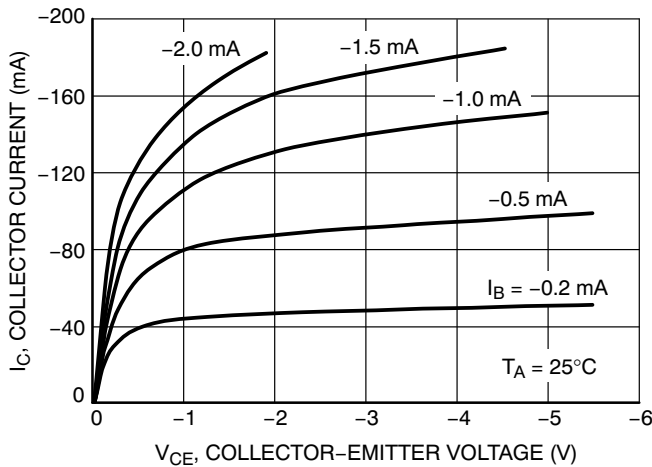


Figure 1. Collector Saturation Region

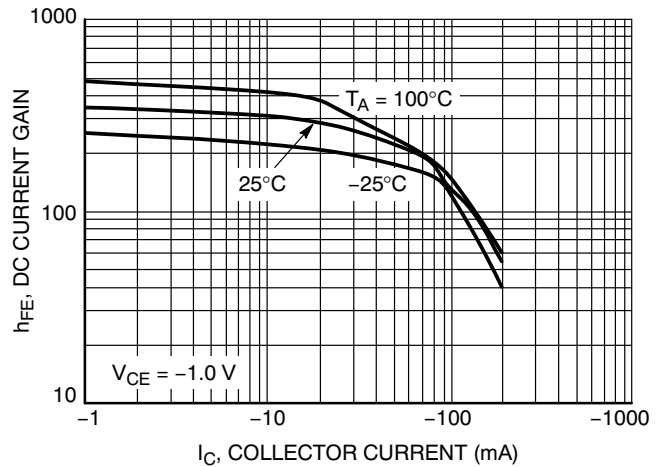


Figure 2. DC Current Gain

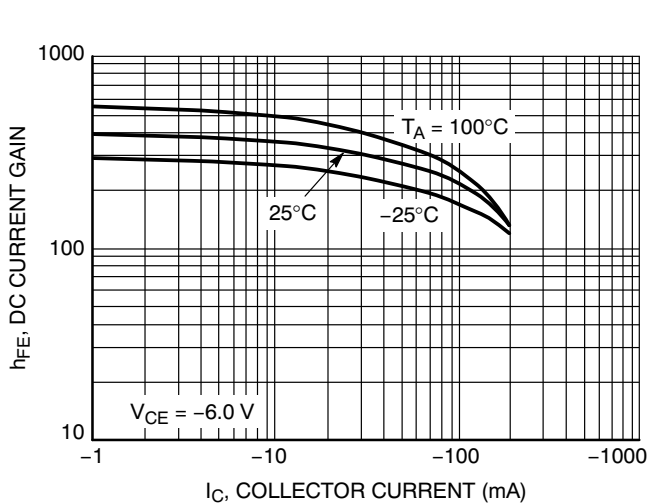


Figure 3. DC Current Gain

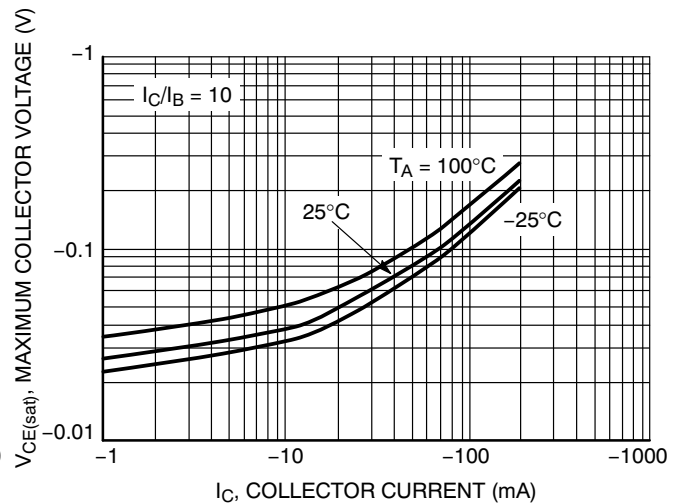


Figure 4.  $V_{CE(sat)}$  versus  $I_C$

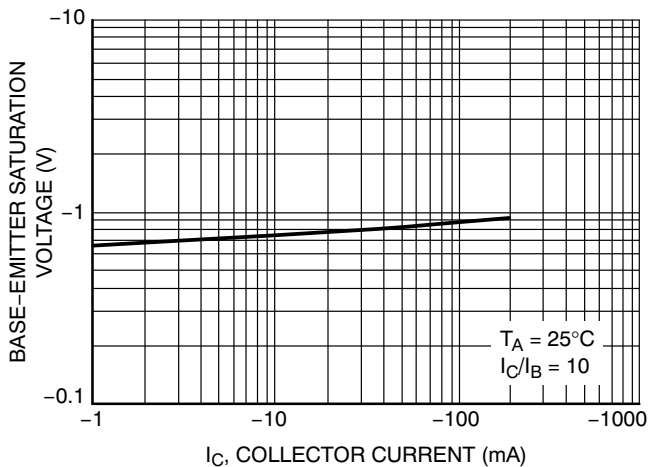


Figure 5.  $V_{BE(sat)}$  versus  $I_C$

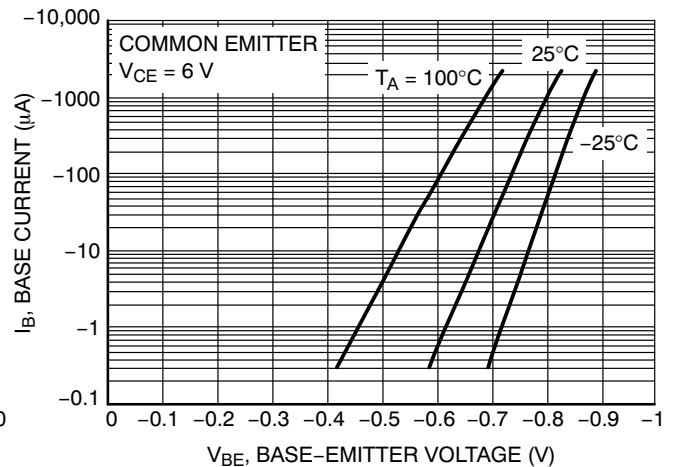


Figure 6. Base-Emitter Voltage

TYPICAL ELECTRICAL CHARACTERISTICS: NPN TRANSISTOR

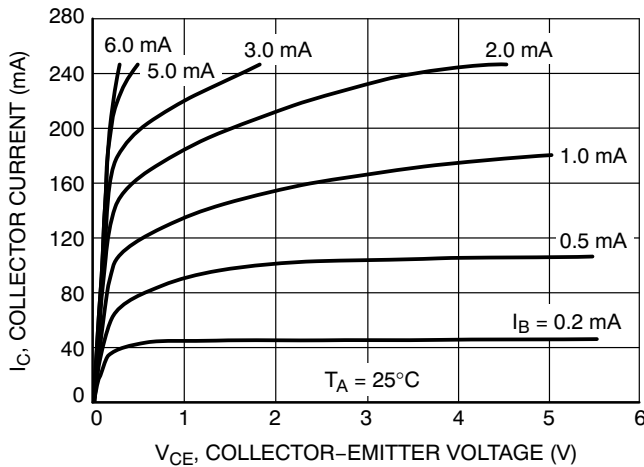


Figure 7. Collector Saturation Voltage

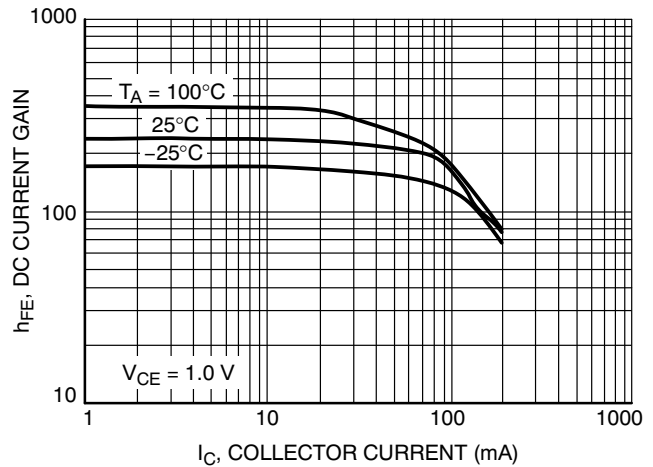


Figure 8. DC Current Gain

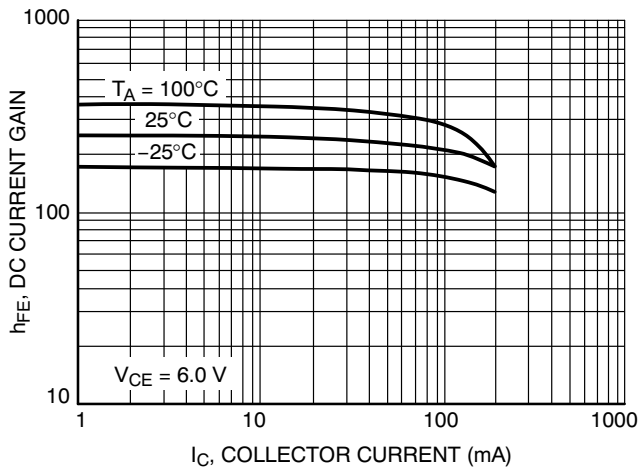


Figure 9. DC Current Gain

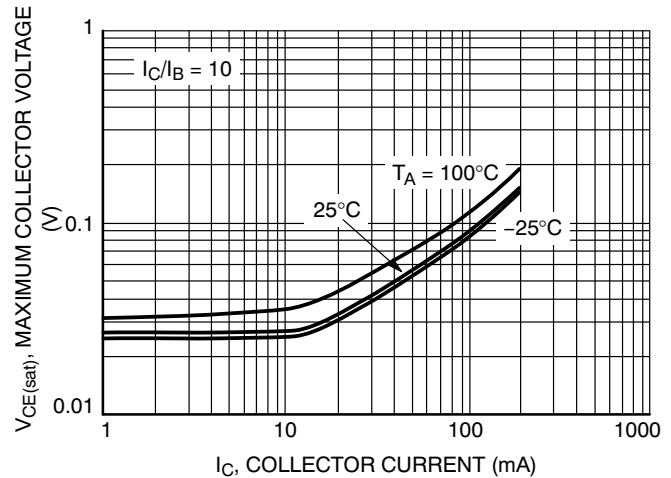


Figure 10.  $V_{CE(sat)}$  versus  $I_C$

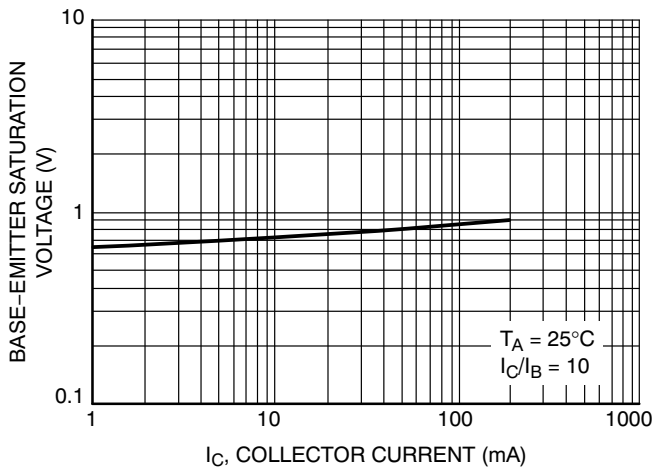


Figure 11.  $V_{BE(sat)}$  versus  $I_C$

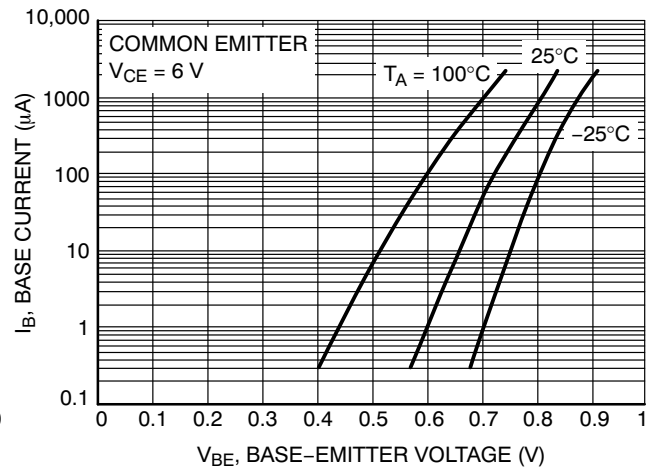
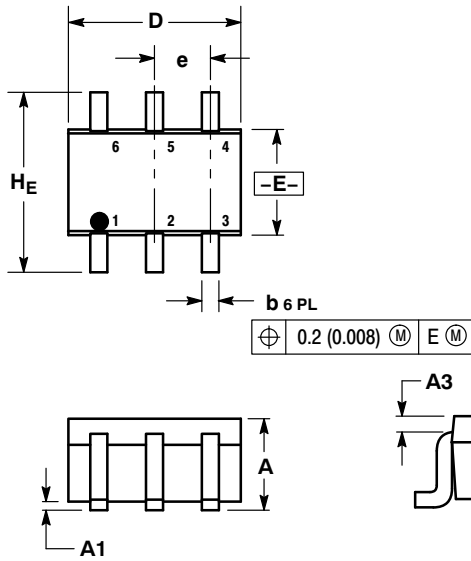


Figure 12. Base-Emitter Voltage

# UMZ1NT1G

## PACKAGE DIMENSIONS

SC-88/SC70-6/SOT-363  
CASE 419B-02  
ISSUE W

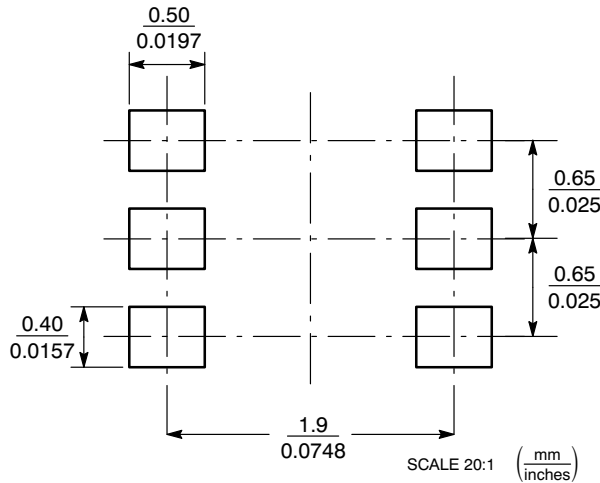


### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

| DIM | MILLIMETERS |      |      | INCHES    |       |       |
|-----|-------------|------|------|-----------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN       | NOM   | MAX   |
| A   | 0.80        | 0.95 | 1.10 | 0.031     | 0.037 | 0.043 |
| A1  | 0.00        | 0.05 | 0.10 | 0.000     | 0.002 | 0.004 |
| A3  | 0.20 REF    |      |      | 0.008 REF |       |       |
| b   | 0.10        | 0.21 | 0.30 | 0.004     | 0.008 | 0.012 |
| C   | 0.10        | 0.14 | 0.25 | 0.004     | 0.005 | 0.010 |
| D   | 1.80        | 2.00 | 2.20 | 0.070     | 0.078 | 0.086 |
| E   | 1.15        | 1.25 | 1.35 | 0.045     | 0.049 | 0.053 |
| e   | 0.65 BSC    |      |      | 0.026 BSC |       |       |
| L   | 0.10        | 0.20 | 0.30 | 0.004     | 0.008 | 0.012 |
| H_E | 2.00        | 2.10 | 2.20 | 0.078     | 0.082 | 0.086 |

### 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.

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