

MAX809 Series, MAX810 Series

Very Low Supply Current 3-Pin Microprocessor Reset Monitors

The MAX809 and MAX810 are cost-effective system supervisor circuits designed to monitor V_{CC} in digital systems and provide a reset signal to the host processor when necessary. No external components are required.

The reset output is driven active within 10 μ sec of V_{CC} falling through the reset voltage threshold. Reset is maintained active for a timeout period which is trimmed by the factory after V_{CC} rises above the reset threshold. The MAX810 has an active-high RESET output while the MAX809 has an active-low $\overline{\text{RESET}}$ output. Both devices are available in SOT-23 and SC-70 packages.

The MAX809/810 are optimized to reject fast transient glitches on the V_{CC} line. Low supply current of 0.5 μ A ($V_{CC} = 3.2$ V) makes these devices suitable for battery powered applications.

Features

- Precision V_{CC} Monitor for 1.5 V, 2.5 V, 3.0 V, 3.3 V, and 5.0 V Supplies
- Precision Monitoring Voltages from 1.2 V to 4.9 V Available in 100 mV Steps
- Four Guaranteed Minimum Power-On Reset Pulse Width Available (1 ms, 20 ms, 100 ms, and 140 ms)
- $\overline{\text{RESET}}$ Output Guaranteed to $V_{CC} = 1.0$ V.
- Low Supply Current
- Compatible with Hot Plug Applications
- V_{CC} Transient Immunity
- No External Components
- Wide Operating Temperature: -40°C to 105°C
- Pb-Free Packages are Available

Typical Applications

- Computers
- Embedded Systems
- Battery Powered Equipment
- Critical Microprocessor Power Supply Monitoring

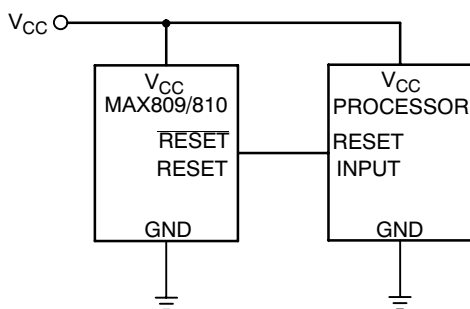
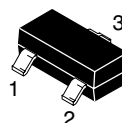


Figure 1. Typical Application Diagram

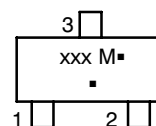


ON Semiconductor®

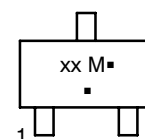
MARKING DIAGRAM



SOT-23
(TO-236)
CASE 318

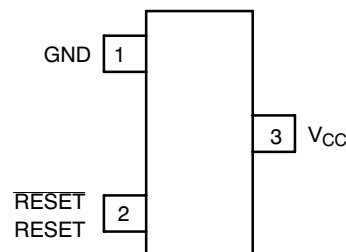


SC-70
(SOT-323)
CASE 419



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

PIN CONFIGURATION



SOT-23/SC-70
(Top View)

NOTE: RESET is for MAX809
RESET is for MAX810

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 10 of this data sheet.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 10 of this data sheet.

MAX809 Series, MAX810 Series

PIN DESCRIPTION

| Pin No. | Symbol | Description |
|---------|-----------------|--|
| 1 | GND | Ground |
| 2 | RESET (MAX809) | RESET output remains low while V _{CC} is below the reset voltage threshold, and for a reset timeout period after V _{CC} rises above reset threshold |
| 2 | RESET (MAX810) | RESET output remains high while V _{CC} is below the reset voltage threshold, and for a reset timeout period after V _{CC} rises above reset threshold |
| 3 | V _{CC} | Supply Voltage (Typ) |

ABSOLUTE MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|----------------------|---------------------------------|--------|
| Power Supply Voltage (V _{CC} to GND) | V _{CC} | -0.3 to 6.0 | V |
| RESET Output Voltage (CMOS) | | -0.3 to (V _{CC} + 0.3) | V |
| Input Current, V _{CC} | | 20 | mA |
| Output Current, RESET | | 20 | mA |
| dV/dt (V _{CC}) | | 100 | V/μsec |
| Thermal Resistance, Junction-to-Air (Note 1) | SOT-23 SC-70 | R _{θJA} 301 314 | °C/W |
| Operating Junction Temperature Range | T _J | -40 to +105 | °C |
| Storage Temperature Range | T _{stg} | -65 to +150 | °C |
| Lead Temperature (Soldering, 10 Seconds) | T _{sol} | +260 | °C |
| ESD Protection Human Body Model (HBM): Following Specification JESD22-A114 Machine Model (MM): Following Specification JESD22-A115 | | 2000 200 | V |
| Latchup Current Maximum Rating: Following Specification JESD78 Class II Positive Negative | I _{Latchup} | 200 200 | mA |

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. This based on a 35x35x1.6mm FR4 PCB with 10mm² of 1 oz copper traces under natural convection conditions and a single component characterization.
2. The maximum package power dissipation limit must not be exceeded.

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}} \quad \text{with } T_{J(max)} = 150^\circ\text{C}$$

MAX809 Series, MAX810 Series

ELECTRICAL CHARACTERISTICS $T_A = -40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ unless otherwise noted. Typical values are at $T_A = +25^{\circ}\text{C}$. (Note 3)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|--|----------|----------------------|----------------------|--------------------------|---------------|
| V_{CC} Range $T_A = 0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | | 1.0 1.2 | - - | 5.5 5.5 | V |
| Supply Current $V_{CC} = 3.3\text{ V}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = 85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ $V_{CC} = 5.5\text{ V}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = 85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | I_{CC} | - - - - | 0.5 - 0.8 - | 1.2 2.0 1.8 2.5 | μA |
| Reset Threshold (V_{in} Decreasing) (Note 4) | V_{TH} | | | | V |
| MAX809SN490 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | | 4.83 4.78 4.66 | 4.9 - - | 4.97 5.02 5.14 | |
| MAX8xxLTR, MAX8xxSQ463 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | | 4.56 4.50 4.40 | 4.63 - - | 4.70 4.75 4.86 | |
| MAX809HTR $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | | 4.48 4.43 4.32 | 4.55 | 4.62 4.67 4.78 | |
| MAX8xxMTR, MAX8xxSQ438 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | | 4.31 4.27 4.16 | 4.38 | 4.45 4.49 4.60 | |
| MAX809JTR, MAX8xxSQ400 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | | 3.94 3.90 3.80 | 4.00 - - | 4.06 4.10 4.20 | |
| MAX8xxTTR, MAX809SQ308 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | | 3.04 3.00 2.92 | 3.08 - - | 3.11 3.16 3.24 | |
| MAX8xxSTR, MAX8xxSQ293 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | | 2.89 2.85 2.78 | 2.93 - - | 2.96 3.00 3.08 | |
| MAX8xxRTR, MAX8xxSQ263 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | | 2.59 2.56 2.49 | 2.63 - - | 2.66 2.70 2.77 | |
| MAX809SN232, MAX809SQ232 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | | 2.28 2.25 2.21 | 2.32 - - | 2.35 2.38 2.45 | |
| MAX809SN160 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | | 1.58 1.56 1.52 | 1.60 - - | 1.62 1.64 1.68 | |
| MAX809SN120, MAX8xxSQ120 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | | 1.18 1.17 1.14 | 1.20 - - | 1.22 1.23 1.26 | |

3. Production testing done at $T_A = 25^{\circ}\text{C}$, over temperature limits guaranteed by design.
4. Contact your ON Semiconductor sales representative for other threshold voltage options.

MAX809 Series, MAX810 Series

ELECTRICAL CHARACTERISTICS (continued) $T_A = -40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ unless otherwise noted. Typical values are at $T_A = +25^{\circ}\text{C}$. (Note 5)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|--|----------|-------------------------|------------------|-------------------------|-------------------------|
| Detector Voltage Threshold Temperature Coefficient | | - | 30 | - | ppm/ $^{\circ}\text{C}$ |
| V_{CC} to Reset Delay $V_{CC} = V_{TH}$ to $(V_{TH} - 100\text{ mV})$ | | - | 10 | - | μsec |
| Reset Active TimeOut Period (Note 6) MAX8xxSN(Q)293D1 MAX8xxSN(Q)293D2 MAX8xxSN(Q)293D3 MAX8xxSN(Q)293 | t_{RP} | 1.0 20 100 140 | - - - - | 3.3 66 330 460 | msec |
| RESET Output Voltage Low (No Load) (MAX809) $V_{CC} = V_{TH} - 0.2\text{ V}$ $1.6\text{ V} \leq V_{TH} \leq 2.0\text{ V}$, $I_{SINK} = 0.5\text{ mA}$ $2.1\text{ V} \leq V_{TH} \leq 4.0\text{ V}$, $I_{SINK} = 1.2\text{ mA}$ $4.1\text{ V} \leq V_{TH} \leq 4.9\text{ V}$, $I_{SINK} = 3.2\text{ mA}$ | V_{OL} | - | - | 0.3 | V |
| RESET Output Voltage High (No Load) (MAX809) $V_{CC} = V_{TH} + 0.2\text{ V}$ $1.6\text{ V} \leq V_{TH} \leq 2.4\text{ V}$, $I_{SOURCE} = 200\ \mu\text{A}$ $2.5\text{ V} \leq V_{TH} \leq 4.9\text{ V}$, $I_{SOURCE} = 500\ \mu\text{A}$ | V_{OH} | $0.8 V_{CC}$ | - | - | V |
| RESET Output Voltage High (No Load) (MAX810) $V_{CC} = V_{TH} + 0.2\text{ V}$ $1.6\text{ V} \leq V_{TH} \leq 2.4\text{ V}$, $I_{SOURCE} = 200\ \mu\text{A}$ $2.5\text{ V} \leq V_{TH} \leq 4.9\text{ V}$, $I_{SOURCE} = 500\ \mu\text{A}$ | V_{OH} | $0.8 V_{CC}$ | - | - | V |
| RESET Output Voltage Low (No Load) (MAX810) $V_{CC} = V_{TH} - 0.2\text{ V}$ $1.6\text{ V} \leq V_{TH} \leq 2.0\text{ V}$, $I_{SINK} = 0.5\text{ mA}$ $2.1\text{ V} \leq V_{TH} \leq 4.0\text{ V}$, $I_{SINK} = 1.2\text{ mA}$ $4.1\text{ V} \leq V_{TH} \leq 4.9\text{ V}$, $I_{SINK} = 3.2\text{ mA}$ | V_{OL} | - | - | 0.3 | V |

5. Production testing done at $T_A = 25^{\circ}\text{C}$, over temperature limits guaranteed by design.

6. Contact your ON Semiconductor sales representative for timeout options availability for other threshold voltage options.

MAX809 Series, MAX810 Series

ORDERING, MARKING AND THRESHOLD INFORMATION

| Part Number | V _{TH} * (V) | Timeout* (ms) | Description | Marking | Package | Shipping† |
|------------------|-----------------------|---------------|-----------------|---------|----------------------|--------------------|
| MAX809SN160T1 | 1.60 | 140-460 | Push-Pull RESET | SAA | SOT23-3 | 3000 / Tape & Reel |
| MAX809SN160T1G | 1.60 | 140-460 | | SAA | SOT23-3 (Pb-Free) | |
| MAX809SN232T1 | 2.32 | 140-460 | | SQP | SOT23-3 | |
| MAX809SN232T1G | 2.32 | 140-460 | | SQP | SOT23-3 (Pb-Free) | |
| MAX809RTR | 2.63 | 140-460 | | SPS | SOT23-3 | |
| MAX809RTRG | 2.63 | 140-460 | | SPS | SOT23-3 (Pb-Free) | |
| MAX809STR | 2.93 | 140-460 | | SPT | SOT23-3 | |
| MAX809STRG | 2.93 | 140-460 | | SPT | SOT23-3 (Pb-Free) | |
| NCV809STRG | 2.93 | 140-460 | | SUC | SOT23-3 (Pb-Free) | |
| MAX809TTR | 3.08 | 140-460 | | SPU | SOT23-3 | |
| MAX809TTRG | 3.08 | 140-460 | | SPU | SOT23-3 (Pb-Free) | |
| MAX809JTR | 4.00 | 140-460 | | SPR | SOT23-3 | |
| MAX809JTRG | 4.00 | 140-460 | | SPR | SOT23-3 (Pb-Free) | |
| MAX809MTR | 4.38 | 140-460 | | SPV | SOT23-3 | |
| MAX809MTRG | 4.38 | 140-460 | | SPV | SOT23-3 (Pb-Free) | |
| MAX809HTR | 4.55 | 140-460 | | SBD | SOT23-3 | |
| MAX809HTRG | 4.55 | 140-460 | | SBD | SOT23-3 (Pb-Free) | |
| MAX809LTR | 4.63 | 140-460 | | SPW | SOT23-3 | |
| MAX809LTRG | 4.63 | 140-460 | | SPW | SOT23-3 (Pb-Free) | |
| NCV809LTRG | 4.63 | 140-460 | | STA | SOT23-3 (Pb-Free) | |
| MAX809SN490T1 | 4.90 | 140-460 | | SBH | SOT23-3 | |
| MAX809SN490T1G | 4.90 | 140-460 | | SBH | SOT23-3 (Pb-Free) | |
| MAX809SN120T1G | 1.20 | 140-460 | | SSO | SOT23-3 (Pb-Free) | |
| MAX809SN293D1T1G | 2.93 | 1-3.3 | | SSP | SOT23-3 (Pb-Free) | |
| MAX809SN293D2T1G | 2.93 | 20-66 | | SSQ | SOT23-3 (Pb-Free) | |
| MAX809SN293D3T1G | 2.93 | 100-330 | | SSR | SOT23-3 (Pb-Free) | |
| MAX809SQ120T1G | 1.20 | 140-460 | | ZD | SC70-3 (Pb-Free) | |
| MAX809SQ232T1G | 2.32 | 140-460 | | ZE | SC70-3 (Pb-Free) | |
| MAX809SQ263T1G | 2.63 | 140-460 | | ZF | SC70-3 (Pb-Free) | |
| MAX809SQ293T1G | 2.93 | 140-460 | | ZG | SC70-3 (Pb-Free) | |
| MAX809SQ308T1G | 3.08 | 140-460 | | ZH | SC70-3 (Pb-Free) | |
| MAX809SQ400T1G | 4.00 | 140-460 | | SZ | SC70-3 (Pb-Free) | |
| MAX809SQ438T1G | 4.38 | 140-460 | | ZI | SC70-3 (Pb-Free) | |
| MAX809SQ463T1G | 4.63 | 140-460 | | ZJ | SC70-3 (Pb-Free) | |
| MAX809SQ293D1T1G | 2.93 | 1-3.3 | | ZK | SC70-3 (Pb-Free) | |
| MAX809SQ293D2T1G | 2.93 | 20-66 | | ZL | SC70-3 (Pb-Free) | |
| MAX809SQ293D3T1G | 2.93 | 100-330 | | ZM | SC70-3 (Pb-Free) | |

MAX809 Series, MAX810 Series

ORDERING, MARKING AND THRESHOLD INFORMATION

| Part Number | V _{TH} * (V) | Timeout* (ms) | Description | Marking | Package | Shipping† |
|------------------|--------------------------|------------------|-----------------|---------|----------------------|--------------------|
| MAX810RTR | 2.63 | 140-460 | Push-Pull RESET | SPX | SOT23-3 | 3000 / Tape & Reel |
| MAX810RTRG | 2.63 | 140-460 | | SPX | SOT23-3 (Pb-Free) | |
| MAX810STR | 2.93 | 140-460 | | SPY | SOT23-3 | |
| MAX810STRG | 2.93 | 140-460 | | SPY | SOT23-3 (Pb-Free) | |
| MAX810TTR | 3.08 | 140-460 | | SPZ | SOT23-3 | |
| MAX810TTRG | 3.08 | 140-460 | | SPZ | SOT23-3 (Pb-Free) | |
| MAX810MTR | 4.38 | 140-460 | | SQA | SOT23-3 | |
| MAX810MTRG | 4.38 | 140-460 | | SQA | SOT23-3 (Pb-Free) | |
| MAX810LTR | 4.63 | 140-460 | | SQB | SOT23-3 | |
| MAX810LTRG | 4.63 | 140-460 | | SQB | SOT23-3 (Pb-Free) | |
| MAX810SN120T1G | 1.20 | 140-460 | | SSS | SOT23-3 (Pb-Free) | |
| MAX810SN293D1T1G | 2.93 | 1-3.3 | | SST | SOT23-3 (Pb-Free) | |
| MAX810SN293D2T1G | 2.93 | 20-66 | | SSU | SOT23-3 (Pb-Free) | |
| MAX810SN293D3T1G | 2.93 | 100-330 | | SSZ | SOT23-3 (Pb-Free) | |
| MAX810SQ120T1G | 1.20 | 140-460 | | ZN | SC70-3 (Pb-Free) | |
| MAX810SQ263T1G | 2.63 | 140-460 | | ZO | SC70-3 (Pb-Free) | |
| MAX810SQ293T1G | 2.93 | 140-460 | | ZP | SC70-3 (Pb-Free) | |
| MAX810SQ438T1G | 4.38 | 140-460 | | ZQ | SC70-3 (Pb-Free) | |
| MAX810SQ463T1G | 4.63 | 140-460 | | ZR | SC70-3 (Pb-Free) | |
| MAX810SQ293D1T1G | 2.93 | 1-3.3 | | ZS | SC70-3 (Pb-Free) | |
| MAX810SQ293D2T1G | 2.93 | 20-66 | | ZT | SC70-3 (Pb-Free) | |
| MAX810SQ293D3T1G | 2.93 | 100-330 | | ZU | SC70-3 (Pb-Free) | |

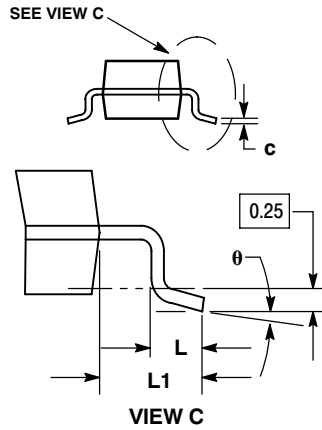
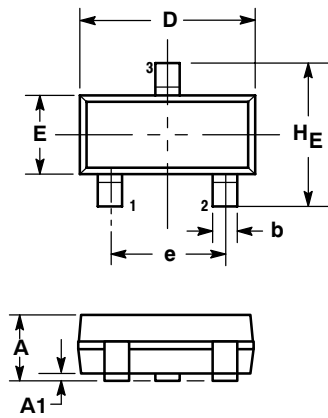
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*Contact your ON Semiconductor sales representative for other threshold voltage options.

MAX809 Series, MAX810 Series

PACKAGE DIMENSIONS

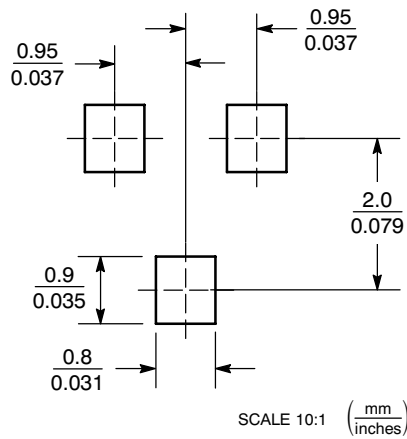
SOT-23 (TO236)
CASE 318-08
ISSUE AN



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
 4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.89 | 1.00 | 1.11 | 0.035 | 0.040 | 0.044 |
| A1 | 0.01 | 0.06 | 0.10 | 0.001 | 0.002 | 0.004 |
| b | 0.37 | 0.44 | 0.50 | 0.015 | 0.018 | 0.020 |
| c | 0.09 | 0.13 | 0.18 | 0.003 | 0.005 | 0.007 |
| D | 2.80 | 2.90 | 3.04 | 0.110 | 0.114 | 0.120 |
| E | 1.20 | 1.30 | 1.40 | 0.047 | 0.051 | 0.055 |
| e | 1.78 | 1.90 | 2.04 | 0.070 | 0.075 | 0.081 |
| L | 0.10 | 0.20 | 0.30 | 0.004 | 0.008 | 0.012 |
| L1 | 0.35 | 0.54 | 0.69 | 0.014 | 0.021 | 0.029 |
| HE | 2.10 | 2.40 | 2.64 | 0.083 | 0.094 | 0.104 |

SOLDERING FOOTPRINT*



SCALE 10:1 (mm/inches)

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