## NLAS4783

## Triple SPDT $1.0 \Omega$ RON Switch

The NLAS4783 is a triple independent ultra-low $\mathrm{R}_{\mathrm{ON}}$ SPDT analog switch with ENABLE. This device is designed for low operating voltage, high current switching of speaker output for cell phone applications. It can switch a balanced stereo output. The NLAS4783 can handle a balanced microphone/speaker/ring-tone generator in a monophone mode. The device contains a break-before-make feature.

## Features

- Single Supply Operation
1.65 to $3.6 \mathrm{~V} \mathrm{~V}_{\mathrm{CC}}$
- Tiny $3 \times 3 \mathrm{~mm}$ 16-Pin QFN Package

Meets JEDEC MO-220 Specifications

- Low Static Power
- OVT on Logic Address and Enable Inputs
- This is a $\mathrm{Pb}-$ Free Device*


## Typical Applications

- Cell Phone Speaker/Microphone Switching
- Ringtone-Chip/Amplifier Switching
- Three Unbalanced (Single-Ended) Switches
- Stereo Balanced (Push-Pull) Switching


## Important Information

- ESD Protection:

Human Body Model $(\mathrm{HBM})>8000 \mathrm{~V}$
Machine Model (MM) > 400 V

- Ringtone-Chip/Amplifier Switching
- Continuous Current Rating Through each Switch $\pm 300 \mathrm{~mA}$
- Conforms to: JEDEC MO-220, Issue H, Variation VEED-6
- Pin-for-Pin Compatible with MAX4783

[^0]ON Semiconductor ${ }^{\circledR}$
http://onsemi.com


PIN CONNECTIONS


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


Figure 1. Input Equivalent Circuit

PIN FUNCTION DESCRIPTION

| QFN PIN \# | Symbol | Description |
| :---: | :---: | :--- |
| 15 | Y 1 | Analog Switch Y Normally Open Input |
| 16 | $\mathrm{Y0}$ | Analog Switch Y Normally Closed Input |
| 1 | Z 1 | Analog Switch Z Normally Open Input |
| 2 | Z | Analog Switch Z Output |
| 3 | Z0 | Analog Switch Z Normally Closed Input |
| 4 | ENABLE | Digital Enable Input. Normally connect to GND. Drive to logic high to set all switches off. |
| 5 | NC | No Connection. Not internally connected. |
| 6 | GND | Ground |
| 7 | C | Digital Address C Input |
| 8 | B | Digital Address B Input |
| 9 | A | Digital Address A Input |
| 10 | X0 | Analog Switch X Normally Closed Input |
| 11 | X1 | Analog Switch X Normally Open Input |
| 12 | X | Analog Switch X Output |
| 13 | Y | Analog Switch Y Output |
| 14 | VCC | Positive Analog and Digital Supply Voltage Input |

TRUTH TABLE/SWITCH PROGRAMMING

| Enable Input | Select Input |  |  | All Switches Open |
| :---: | :---: | :---: | :---: | :---: |
|  | C | B | A |  |
| H | X | X | X |  |
| L | L | L | L | $\begin{aligned} & \mathrm{X}-\mathrm{XO} \\ & \mathrm{Y}-\mathrm{YO} \\ & \mathrm{Z}-\mathrm{ZO} \end{aligned}$ |
| L | L | L | H | $\begin{aligned} & \mathrm{X}-\mathrm{X1} \\ & \mathrm{Y}-\mathrm{YO} \\ & \mathrm{Z}-\mathrm{ZO} \end{aligned}$ |
| L | L | H | L | $\begin{aligned} & \hline X-X 0 \\ & Y-Y 1 \\ & Z-Z 0 \end{aligned}$ |
| L | L | H | H | $\begin{aligned} & \hline X-X 1 \\ & Y-Y 1 \\ & Z-Z 0 \end{aligned}$ |
| L | H | L | L | $\begin{aligned} & \hline \mathrm{X}-\mathrm{XO} \\ & \mathrm{Y}-\mathrm{Y0} \\ & \mathrm{Z}-\mathrm{Z1} \end{aligned}$ |
| L | H | L | H | $\begin{aligned} & \hline \mathrm{X}-\mathrm{X1} \\ & \mathrm{Y}-\mathrm{Y0} \\ & \mathrm{Z}-\mathrm{Z} 1 \end{aligned}$ |
| L | H | H | L | $\begin{aligned} & \hline \mathrm{X}-\mathrm{X0} \\ & \mathrm{Y}-\mathrm{Y} 1 \\ & \mathrm{Z}-\mathrm{Z} 1 \end{aligned}$ |
| L | H | H | H | $\begin{aligned} & \mathrm{X}-\mathrm{X} 1 \\ & \mathrm{Y}-\mathrm{Y} 1 \\ & \mathrm{Z}-\mathrm{Z} 1 \end{aligned}$ |

1. Input and output pins are identical and interchangeable. Both pins can be considered input or output. Bidirectional signal pass.

MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
| :---: | :--- | :---: | :---: |
| $\mathrm{V}_{\mathrm{CC}}$ | Positive DC Supply Voltage | -0.5 to +4.6 | V |
| $\mathrm{~V}_{\mathrm{IS}}$ | Analog Input Voltage ( $\mathrm{V}_{\text {NO }}, \mathrm{V}_{\mathrm{NC}}$, or $\left.\mathrm{V}_{\mathrm{COM}}\right)$ | -0.5 to $\mathrm{V}_{\mathrm{CC}}$ | V |
| $\mathrm{V}_{\mathrm{IN}}$ | Digital Select Input Voltage | -0.5 to +4.6 | V |
| $\mathrm{I}_{\text {anl1 }}$ | Continuous DC Current from COM to NC/NO | $\pm 300$ | mA |
| $\mathrm{I}_{\text {anl-pk } 1}$ | Peak Current from COM to NC/NO, 10 Duty Cycles (Note 2) | $\pm 500$ | mA |
| $\mathrm{I}_{\mathrm{clmp}}$ | Continuous DC Current into COM/NC/NO with Respect to $\mathrm{V}_{\mathrm{CC}}$ or GND | $\pm 100$ | 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.
2. Defined as $10 \%$ ON, $90 \%$ off duty cycle.

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Max | Unit |
| :---: | :--- | :---: | :---: | :---: |
| $\mathrm{V}_{\mathrm{CC}}$ | Positive DC Supply Voltage | 1.65 | 3.6 | V |
| $\mathrm{~V}_{\mathrm{IS}}$ | Analog Input Voltage $\left(\mathrm{V}_{\mathrm{NO}}, \mathrm{V}_{\mathrm{NC}}\right.$, or $\left.\mathrm{V}_{\mathrm{COM}}\right)$ | - | $\mathrm{V}_{\mathrm{CC}}$ | V |
| $\mathrm{V}_{\mathrm{IN}}$ | Digital Select Input Voltage | - | $\mathrm{V}_{\mathrm{CC}}$ | V |
| $\mathrm{T}_{\mathrm{A}}$ | Operating Temperature Range | -40 | 85 | ${ }^{\circ} \mathrm{C}$ |
| $\mathrm{t}_{\mathrm{r}} \mathrm{t}_{\mathrm{f}}$ | Input Rise or Fall Time, SELECT |  | - | 20 |
|  |  | $\mathrm{~V}_{\mathrm{CC}}=1.6-2.7 \mathrm{~V}$ |  |  |
| $\mathrm{~V}_{\mathrm{CC}}=3.0-3.6 \mathrm{~V}$ | - | 10 |  |  |

DC CHARACTERISTICS - Digital Section (Voltages Referenced to GND)

| Symbol | Parameter | Condition | $\mathrm{V}_{\mathrm{cc}}$ | Guaranteed Limit |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | $-40^{\circ} \mathrm{C}$ to $25^{\circ} \mathrm{C}$ | $<85^{\circ} \mathrm{C}$ |  |
| $\mathrm{V}_{\mathrm{IH}}$ | Minimum High-Level Input Voltage, Select Inputs |  | $\begin{gathered} 1.65 \\ 2.7 \\ 3.6 \end{gathered}$ | $\begin{aligned} & 1.0 \\ & 1.4 \\ & 1.8 \end{aligned}$ | $\begin{aligned} & 1.0 \\ & 1.4 \\ & 1.8 \end{aligned}$ | V |
| $\mathrm{V}_{\text {IL }}$ | Maximum Low-Level Input Voltage, Select Inputs |  | $\begin{gathered} 1.65 \\ 2.7 \\ 3.6 \end{gathered}$ | $\begin{aligned} & 0.4 \\ & 0.5 \\ & 0.6 \end{aligned}$ | $\begin{aligned} & 0.4 \\ & 0.5 \\ & 0.6 \end{aligned}$ | V |
| IN | Maximum Input Leakage Current, Select Inputs | $\mathrm{V}_{\mathrm{IN}}=3.6 \mathrm{~V}$ or GND | 3.6 | $\pm 0.1$ | $\pm 1.0$ | $\mu \mathrm{A}$ |
| IOFF | Power Off Leakage Current | $\mathrm{V}_{\text {IN }}=3.6 \mathrm{~V}$ or GND | 0 | $\pm 0.5$ | $\pm 2.0$ | $\mu \mathrm{A}$ |
| $I_{\text {cc }}$ | Maximum Quiescent Supply Current (Note 3) | Select and $\mathrm{V}_{\text {IS }}=\mathrm{V}_{\text {CC }}$ or GND | 1.65 to 3.6 | $\pm 1.0$ | $\pm 2.0$ | $\mu \mathrm{A}$ |

## DC ELECTRICAL CHARACTERISTICS - Analog Section

| Symbol | Parameter | Condition | $\mathrm{V}_{\mathrm{cc}}$ | Guaranteed Maximum Limit |  |  |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | $-40^{\circ} \mathrm{C}$ to $25^{\circ} \mathrm{C}$ |  | $<85^{\circ} \mathrm{C}$ |  |  |
|  |  |  |  | Min | Max | Min | Max |  |
| R ${ }_{\text {ON }}$ | NC/NO On-Resistance (Note 3) | $\begin{aligned} & \mathrm{V}_{\text {IN }} \leq \mathrm{V}_{\mathrm{IL}} \text { or } \mathrm{V}_{\mathrm{IN}} \geq \mathrm{V}_{\mathrm{IH}} \\ & \mathrm{~V}_{\mathrm{IS}}=\mathrm{GND} \text { to } \mathrm{V}_{\mathrm{CC}} \\ & \mathrm{I}_{\mathrm{IN}} \leq 100 \mathrm{~mA} \end{aligned}$ | 2.7-3.6 |  | 1.0 |  | 1.2 | $\Omega$ |
| $\mathrm{R}_{\text {FLAT }}$ | NC/NO On-Resistance Flatness (Notes 3, 5) | $\begin{aligned} & \mathrm{I}_{\mathrm{COM}}=100 \mathrm{~mA} \\ & \mathrm{~V}_{\text {IS }}=0 \text { to } \mathrm{V}_{\mathrm{CC}} \end{aligned}$ | 2.7-3.6 |  | 0.2 |  | 0.2 | $\Omega$ |
| $\Delta \mathrm{R}_{\mathrm{ON}}$ | On-Resistance Match Between Channels (Notes 3 and 4) | $\begin{aligned} & \mathrm{V}_{\mathrm{IS}}=1.3 \mathrm{~V} ; \\ & \mathrm{I} \text { com }=100 \mathrm{~mA} \end{aligned}$ | 2.7-3.6 |  | 0.4 |  | 0.6 | $\Omega$ |
| $I_{\text {NC(OFF) }}$ INO(OFF) | NC or NO Off Leakage Current (Note 3) | $\begin{aligned} & \hline \mathrm{V}_{\mathrm{IN}}=\mathrm{V}_{\mathrm{IL}} \text { or } \mathrm{V}_{\mathrm{IH}} \\ & \mathrm{~V}_{\mathrm{NO} \text { or } \mathrm{V}_{\mathrm{NC}}=0.3 \mathrm{~V}}^{\mathrm{V}_{\mathrm{COM}}=3.3 \mathrm{~V}} \end{aligned}$ | 3.6 | -5.0 | 5.0 | -10 | 10 | nA |
| $\mathrm{I}_{\text {COM (ON) }}$ | COM ON <br> Leakage Current (Note 3) | $\mathrm{V}_{\mathrm{IN}}=\mathrm{V}_{\mathrm{IL}} \text { or } \mathrm{V}_{\mathrm{IH}}$ <br> $\mathrm{V}_{\mathrm{NO}} 0.3 \mathrm{~V}$ or 3.3 V with <br> $\mathrm{V}_{\mathrm{NC}}$ floating or <br> $\mathrm{V}_{\mathrm{NC}} 0.3 \mathrm{~V}$ or 3.3 V with <br> $\mathrm{V}_{\mathrm{NO}}$ floating <br> $\mathrm{V}_{\text {COM }}=0.3 \mathrm{~V}$ or 3.3 V | 3.6 | -10 | 10 | -100 | 100 | nA |

3. Guaranteed by design. Resistance measurements do not include test circuit or package resistance.
4. $\Delta \mathrm{R}_{\mathrm{ON}}=\mathrm{R}_{\mathrm{ON}(\mathrm{MAX})}-\mathrm{R}_{\mathrm{ON}(\mathrm{MIN})}$ between NC1 and NC2 or between NO1 and NO2.
5. Flatness is defined as the difference between the maximum and minimum value of on-resistance as measured over the specified analog signal ranges.

AC ELECTRICAL CHARACTERISTICS (Input $\mathrm{t}_{\mathrm{r}}=\mathrm{t}_{\mathrm{f}}=3.0 \mathrm{~ns}$ )

| Symbol | Parameter | Test Conditions | $\mathrm{V}_{\mathrm{cc}}$ <br> (V) | $\begin{aligned} & V_{\text {IS }} \\ & (V) \end{aligned}$ | Guaranteed Maximum Limit |  |  |  |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | $-40^{\circ} \mathrm{C}$ to $25^{\circ} \mathrm{C}$ |  |  | $<85^{\circ} \mathrm{C}$ |  |  |
|  |  |  |  |  | Min | Typ* | Max | Min | Max |  |
| ton | Turn-On Time | $\mathrm{R}_{\mathrm{L}}=50 \Omega, \mathrm{C}_{\mathrm{L}}=35 \mathrm{pF}$ <br> (Figures 3 and 4) | 2.3-3.6 | 1.5 |  |  | 25 |  | 27 | ns |
| $\mathrm{t}_{\text {OFF }}$ | Turn-Off Time | $\mathrm{R}_{\mathrm{L}}=50 \Omega, \mathrm{C}_{\mathrm{L}}=35 \mathrm{pF}$ <br> (Figures 3 and 4) | 2.3-3.6 | 1.5 |  |  | 15 |  | 20 | ns |
| $\mathrm{t}_{\text {BBM }}$ | Minimum Break-Before-Make Time | $\begin{aligned} & \mathrm{V}_{\mathrm{IS}}=3.0 \\ & \mathrm{R}_{\mathrm{L}}=300 \Omega, \mathrm{C}_{\mathrm{L}}=35 \mathrm{pF} \\ & \text { (Figure 2) } \end{aligned}$ | 3.0 | 1.5 | 2.0 | 8.0 |  |  |  | ns |


| Typical @ 25, $\mathbf{V}_{\mathbf{C C}}=\mathbf{3 . 6} \mathbf{~ V}$ |  |  |  |
| :---: | :--- | :---: | :---: |
| $\mathrm{C}_{\mathrm{IN}}$ | Control Pin Input Capacitance | 2.5 | pF |
| $\mathrm{C}_{\mathrm{SN}}$ | SN Port Capacitance | 75 | pF |
| $\mathrm{C}_{\mathrm{D}}$ | D Port Capacitance When Switch is Enabled | 240 | pF |

*Typical Characteristics are at $25^{\circ} \mathrm{C}$.

ADDITIONAL APPLICATION CHARACTERISTICS (Voltages Referenced to GND Unless Noted)

| Symbol | Parameter | Condition | $\begin{aligned} & V_{c c} \\ & \text { (V) } \end{aligned}$ | $25^{\circ} \mathrm{C}$ | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Typical |  |
| BW | Maximum On-Channel -3dB Bandwidth or Minimum Frequency Response | $\mathrm{V}_{\text {IN }}$ centered between $\mathrm{V}_{\mathrm{CC}}$ and GND <br> (Figure 5) | 1.65-3.6 | 17 | MHz |
| $\mathrm{V}_{\text {ONL }}$ | Maximum Feed-through On Loss | $\begin{aligned} & \hline \mathrm{V}_{\mathrm{IN}}=0 \mathrm{dBm} @ 100 \mathrm{kHz} \text { to } 50 \mathrm{MHz} \\ & \mathrm{~V}_{\mathrm{IN}} \text { centered between } \mathrm{V}_{\mathrm{CC}} \text { and } \mathrm{GND} \text { (Figure 5) } \end{aligned}$ | 1.65-3.6 | -0.10 | dB |
| VISO | Off-Channel Isolation | $\begin{aligned} & \hline f=100 \mathrm{kHz} ; \mathrm{V}_{\mathrm{IS}}=1 \mathrm{~V} \mathrm{RMS} ; \mathrm{C}_{\mathrm{L}}=5 \mathrm{nF} \\ & \mathrm{~V}_{\mathrm{IN}} \text { centered between } \mathrm{V}_{\mathrm{CC}} \text { and } \mathrm{GND} \text { (Figure 5) (Note 6) } \end{aligned}$ | 1.65-3.6 | -62 | dB |
| Q | Charge Injection Select Input to Common I/O | $\begin{aligned} & \mathrm{V}_{I N}=\mathrm{V}_{\mathrm{CC} \text { to }} \mathrm{GND}, \mathrm{R}_{\mathrm{IS}}=0 \Omega, \mathrm{C}_{\mathrm{L}}=1 \mathrm{nF} \\ & \mathrm{Q}=\mathrm{C}_{\mathrm{L}} \times \Delta \mathrm{V}_{\text {OUT }} \text { (Figure 6) } \end{aligned}$ | 1.65-3.6 | 50 | pC |
| THD | Total Harmonic Distortion THD + Noise | $\begin{aligned} & \mathrm{F}_{\text {IS }}=20 \mathrm{~Hz} \text { to } 20 \mathrm{kHz}, \mathrm{R}_{\mathrm{L}}=\mathrm{R}_{\text {gen }}=600 \Omega, \mathrm{C}_{\mathrm{L}}=50 \mathrm{pF} \\ & \mathrm{~V}_{\mathrm{IS}}=2 \mathrm{VRMS} \end{aligned}$ | 3.0 | 0.015 | \% |
| VCT | Channel-to-Channel Crosstalk | $\mathrm{f}=100 \mathrm{kHz} ; \mathrm{V}_{\mathrm{IS}}=1 \mathrm{VRMS}, \mathrm{C}_{\mathrm{L}}=5 \mathrm{pF}, \mathrm{R}_{\mathrm{L}}=50 \Omega$ <br> $\mathrm{V}_{\mathrm{IN}}$ centered between $\mathrm{V}_{\mathrm{CC}}$ and GND (Figure 5) | 1.65-3.6 | -62 | dB |

6. Off-Channel Isolation = $20 \log 10(\mathrm{Vcom} / \mathrm{Vno}), \mathrm{Vcom}=$ output, $\mathrm{Vno}=$ input to off switch.


Figure 2. $\mathrm{t}_{\mathrm{BBM}}$ (Time Break-Before-Make)


Figure 3. $\mathrm{t}_{\mathrm{ON}} / \mathrm{t}_{\mathrm{OFF}}$


Figure 4. $\mathrm{t}_{\mathrm{ON}} / \mathrm{t}_{\mathrm{OFF}}$


Channel switch control/s test socket is normalized. Off isolation is measured across an off channel. On loss is the bandwidth of an On switch. $\mathrm{V}_{\text {ISO }}$, Bandwidth and $\mathrm{V}_{\text {ONL }}$ are independent of the input signal direction.
$\mathrm{V}_{\text {ISO }}=$ Off Channel Isolation $=20 \log \left(\frac{\mathrm{~V}_{\text {OUT }}}{\mathrm{V}_{\text {IN }}}\right)$ for $\mathrm{V}_{\text {IN }}$ at 100 kHz
$\mathrm{V}_{\text {ONL }}=$ On Channel Loss $=20 \log \left(\frac{\mathrm{~V}_{\text {OUT }}}{\mathrm{V}_{\text {IN }}}\right)$ for $\mathrm{V}_{\text {IN }}$ at 100 kHz to 50 MHz
Bandwidth $(\mathrm{BW})=$ the frequency 3 dB below $\mathrm{V}_{\mathrm{ONL}}$
$\mathrm{V}_{\mathrm{CT}}=$ Use $\mathrm{V}_{\text {ISO }}$ setup and test to all other switch analog input/outputs terminated with $50 \Omega$

Figure 5. Off Channel Isolation/On Channel Loss (BW)/Crosstalk (On Channel to Off Channel)/V ${ }_{\text {ONL }}$


Output


Figure 6. Charge Injection: (Q)


Figure 7. On-Resistance vs. Input Voltage


Figure 9. Ron vs. $\mathrm{V}_{\mathbf{I N}}$ vs. Temperature $@ V_{C C}=3.6 \mathrm{~V}$


Figure 8. R $\mathrm{RON}_{\mathrm{ON}}$ vs. $\mathrm{V}_{\text {IN }}$ vs. Temperature @ $\mathrm{V}_{\mathrm{CC}}=3.0 \mathrm{~V}$


Figure 10. Total Harmonic Distortion vs. Frequency

ORDERING INFORMATION

| Device Order <br> Number | Device Nomenclature |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Circuit <br> Indicator | Technology | Device <br> Function | Tape \& Reel <br> Suffix | Package Type | Tape \& Reel Size ${ }^{\dagger}$ |
|  | NL | AS | 4783 | R2 | QFN <br> (Pb-Free) | 3000 Tape \& Reel |

$\dagger$ 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.

## PACKAGE DIMENSIONS

QFN16 3x3, 0.5P CASE 485AE-01
ISSUE A


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED

TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 MM FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS
5. OUTLINE MEETS JEDEC DIMENSIONS PER
MO-220, VARIATION VEED-6.

|  | MILLIMETERS |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| DIM | MIN | NOM | MAX |  |  |
| A | 0.80 | 0.90 | 1.00 |  |  |
| A1 | 0.00 | 0.03 | 0.05 |  |  |
| A3 | 0.20 REF |  |  |  |  |
| b | 0.18 | 0.25 |  |  |  |
| D | 3.00 BSC 0.30 |  |  |  |  |
| D2 | 1.25 | 1.40 |  |  | 1.55 |
| E | 3.00 BSC |  |  |  |  |
| E2 | 1.25 | 1.40 |  |  | 1.55 |
| e | 0.50 BSC |  |  |  |  |
| K | 0.20 | --- | --- |  |  |
| L | 0.30 | 0.40 | 0.50 |  |  |
| L1 | 0.00 | --- | 0.15 |  |  |

[^1]
## PUBLICATION ORDERING INFORMATION

## LITERATURE FULFILLMENT

Literature Distribution Center for ON Semiconductor P.O. Box 5163, Denver, Colorado 80217 USA

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[^0]:    *For additional information on our $\mathrm{Pb}-$ Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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