

Thank you for your interest in **onsemi** products.
Your technical document begins on the following pages.



Your Feedback is Important to Us!

Please take a moment to participate in our short survey.
At **onsemi**, we are dedicated to delivering technical content that best meets your needs.

Help Us Improve – Take the Survey

This survey is intended to collect your feedback, capture any issues you may encounter, and to provide improvements you would like to suggest.

We look forward to your feedback.

To learn more about **onsemi**, please visit our website at
www.onsemi.com

onsemi and **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** product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner. Other names and brands may be claimed as the property of others.

Dual 2-to-4 Decoder/Demultiplexer

74VHC139

General Description

The VHC139 is an advanced high speed CMOS Dual 2-to-4 Decoder/Demultiplexer fabricated with silicon gate CMOS technology. It achieves the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation.

The active LOW enable input can be used for gating or it can be used as a data input for demultiplexing applications. When the enable input is held HIGH, all four outputs are fixed at a HIGH logic level independent of the other inputs. An input protection circuit ensures that 0 V to 5.5 V can be applied to the input pins without regard to the supply voltage.

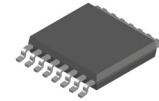
This device can be used to interface 5 V to 3 V systems and two supply systems such as battery back up. This circuit prevents device destruction due to mismatched supply and input voltages.

Features

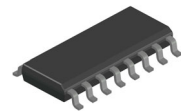
- High Speed: $t_{PD} = 5.0 \text{ ns}$ (typ.) at $T_A = 25^\circ\text{C}$
- Low Power Dissipation: $I_{CC} = 4 \mu\text{A}$ (Max.) at $T_A = 25^\circ\text{C}$
- High Noise Immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (min.)
- Power Down Protection is Provided on All Inputs
- Pin and Function Compatible with 74HC139
- Pb-Free, Halogen Free/BFR Free and RoHS Compliant

TRUTH TABLE

| Inputs | | | Outputs | | | |
|-----------|-------|-------|-------------|-------------|-------------|-------------|
| \bar{E} | A_0 | A_1 | \bar{O}_0 | \bar{O}_1 | \bar{O}_2 | \bar{O}_3 |
| H | X | X | H | H | H | H |
| L | L | L | L | H | H | H |
| L | H | L | H | L | H | H |
| L | L | H | H | H | L | H |
| L | H | H | H | H | H | L |

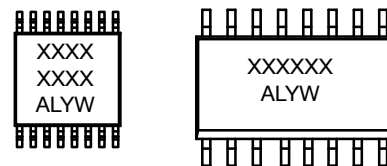


TSSOP-16,
CASE 948AH



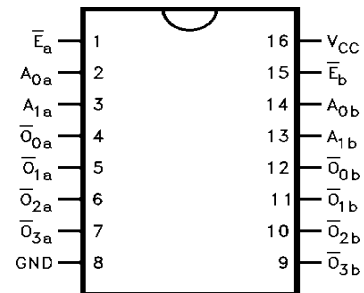
SOIC-16,
CASE 751BG

MARKING DIAGRAM



XXXXXXX = Specific Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
WW,W = Work Week

CONNECTION DIAGRAM



PIN DESCRIPTION

| Pin Names | Description |
|-----------------------|----------------|
| A_0, A_1 | Address Inputs |
| \bar{E} | Enable Inputs |
| $\bar{O}_0-\bar{O}_3$ | Enable Inputs |

ORDERING INFORMATION

See detailed ordering and shipping information on page 3 of this data sheet.

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | | Ratings | Unit |
|------------------|---|--|---------------------------------|------|
| V _{CC} | DC Supply Voltage | | –0.5 to + 6.5 | V |
| V _I | DC Input Voltage | | –0.5 to + 6.5 | V |
| V _{OUT} | DC Output Voltage | | –0.5 V to V _{CC} + 0.5 | V |
| I _{IN} | DC Input Current, Per pin | | ±20 | mA |
| I _{OUT} | DC Output Current, Per pin | | ±25 | mA |
| I _{CC} | DC Supply Current Current, V _{CC} and GND Per pins | | ±75 | mA |
| I _{IK} | Input Clamp Current | | –20 | mA |
| I _{OK} | Output Clamp Current | | ±20 | °C |
| T _{STG} | Storage Temperature Range | | –65 to +150 | °C |
| T _L | Lead Temperature, 1 mm from Case for 10 secs | | 260 | °C |
| T _J | Junction Temperature Under Bias | | +150 | °C |
| θ _{JA} | Thermal Resistance (Note 2) | SOIC–16 QFN16 TSSOP–16 | 126 118 159 | °CW |
| P _D | Power Dissipation in Still Air at 25°C | SOIC–16 QFN16 TSSOP–16 | 995 1062 787 | mW |
| MSL | Moisture Sensitivity | | Level 1 | – |
| F _R | Flammability Rating (Note 2) | Oxygen Index: 28 to 34 | UL 94 V–0 @ 0.139 in | – |
| V _{ESD} | ESD Withstand Voltage (Note 3) | Human Body Model Charged Device Model | 2000 N/A | V |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Applicable to devices with outputs that may be tri–stated.
2. Measured with minimum pad spacing on an FR4 board, using 76mm–by–114mm, 2–ounce copper trace no air flow per JESD51–7.
3. HBM tested to EIA / JESD22–A114–A. CDM tested to JESD22–C101–A. JEDEC recommends that ESD qualification to EIA/JESD22–A115A (Machine Model) be discontinued.

RECOMMENDED OPERATING CONDITIONS (Note 3)

| Symbol | Parameter | Min. | Max. | Unit |
|---------------------------------|----------------------------|--|-----------------|------|
| V _{CC} | DC Supply Voltage | 2.0 | 5.5 | V |
| V _{IN} | DC Input Voltage (Note 4) | 0 | 5.5 | V |
| V _{OUT} | DC Output Voltage (Note 4) | 0 | V _{CC} | V |
| T _A | Operating Temperature | –40 | +85 | °C |
| t _r , t _f | Input Rise or Fall Rate | V _{CC} = 3.0 V to 3.6 V V _{CC} = 4.5 V to 5.5 V | 0 100 20 | ns/V |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

74VHC139

DC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Conditions | V _{CC} (V) | T _A = 25°C | | | T _A = -40°C to +85°C | | Unit |
|-----------------|---------------------------|--|--------------------------|-----------------------|------|---------------------|---------------------------------|---------------------|------|
| | | | | Min | Typ | Max | Min | Max | |
| V _{IH} | HIGH Level Input Voltage | | 2.0 | 1.50 | – | – | 1.50 | – | V |
| | | | 3.0–5.5 | 0.7 V _{CC} | – | – | 0.7 V _{CC} | – | |
| V _{IL} | LOW Level Input Voltage | | 2.0 | – | – | 0.50 | – | 0.50 | V |
| | | | 3.0–5.5 | – | – | 0.3 V _{CC} | – | 0.3 V _{CC} | |
| V _{OH} | HIGH Level Output Voltage | V _{IN} = V _{IH} or V _{IL} | I _{OH} = –50 µA | 2.0 | 1.9 | 2.0 | – | 1.9 | V |
| | | | | 3.0 | 2.9 | 3.0 | – | 2.9 | |
| | | | | 4.5 | 4.4 | 4.5 | – | 4.4 | |
| | | | I _{OH} = –4 mA | 3.0 | 2.58 | – | – | 2.48 | |
| | | | I _{OH} = –8 mA | 4.5 | 3.94 | – | – | 3.80 | |
| V _{OL} | LOW Level Output Voltage | V _{IN} = V _{IH} or V _{IL} | I _{OL} = 50 µA | 2.0 | – | 0.0 | 0.1 | – | V |
| | | | | 3.0 | – | 0.0 | 0.1 | – | |
| | | | | 4.5 | – | 0.0 | 0.1 | – | |
| | | | I _{OL} = 4 mA | 3.0 | – | – | 0.36 | – | |
| | | | I _{OL} = 8 mA | 4.5 | – | – | 0.36 | – | |
| I _{IN} | Input Leakage Current | V _{IN} = 5.5 V or GND | 0–5.5 | – | – | ±0.1 | – | ±1.0 | µA |
| I _{CC} | Quiescent Supply Current | V _{IN} = V _{CC} or GND | 5.5 | – | – | 40.0 | – | 40.0 | µA |

AC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Conditions | V _{CC} (V) | T _A = 25°C | | | T _A = -40°C to +85°C | | Unit |
|------------------|-------------------------------|------------------------|---------------------|-----------------------|-----|------|---------------------------------|------|------|
| | | | | Min | Typ | Max | Min | Max | |
| t _{PLH} | Propagation Delay | C _L = 15 pF | 3.3 ±0.3 | – | 7.2 | 11.0 | 1.0 | 13.0 | ns |
| | | C _L = 50 pF | | – | 9.7 | 14.5 | 1.0 | 16.5 | |
| t _{PHL} | A _n to \bar{O}_n | C _L = 15 pF | 5.0 ±0.5 | – | 5.0 | 7.2 | 1.0 | 8.5 | ns |
| | | C _L = 50 pF | | – | 6.5 | 9.2 | 1.0 | 10.5 | |
| t _{PLH} | Propagation Delay | C _L = 15 pF | 3.3 ±0.3 | – | 6.4 | 9.2 | 1.0 | 11.0 | ns |
| | | C _L = 50 pF | | – | 8.9 | 12.7 | 1.0 | 14.5 | |
| t _{PHL} | \bar{E}_n to \bar{O}_n | C _L = 15 pF | 5.0 ±0.5 | – | 4.4 | 6.3 | 1.0 | 7.5 | ns |
| | | C _L = 50 pF | | – | 5.9 | 8.3 | 1.0 | 9.5 | |
| C _{IN} | Input Capacitance | V _{CC} = Open | – | – | 4 | 10 | – | 10 | pF |
| C _{PD} | Power Dissipation Capacitance | (Note 3) | – | – | 26 | – | – | – | pF |

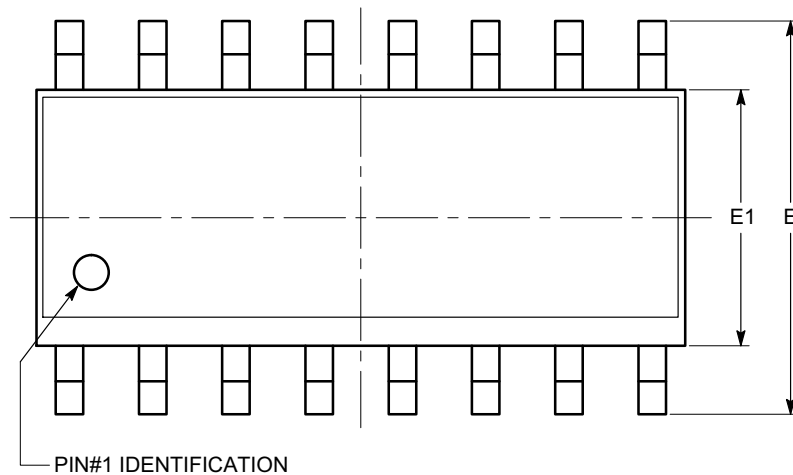
ORDERING INFORMATION

| Device | Marking | Package | Shipping [†] |
|--------------|---------|----------|---------------------------|
| 74VHC139MX | VHC139 | SOIC–16 | 2,500 Units / Tape & Reel |
| 74VHC139MTCX | VHC139 | TSSOP–16 | 2,500 Units / Tape & 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](#).

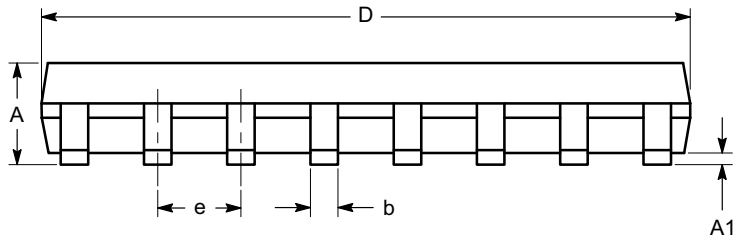
SOIC-16, 150 mils
CASE 751BG
ISSUE O

DATE 19 DEC 2008

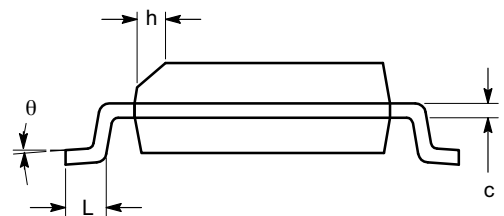


| SYMBOL | MIN | NOM | MAX |
|--------|----------|------|-------|
| A | 1.35 | | 1.75 |
| A1 | 0.10 | | 0.25 |
| b | 0.33 | | 0.51 |
| c | 0.19 | | 0.25 |
| D | 9.80 | 9.90 | 10.00 |
| E | 5.80 | 6.00 | 6.20 |
| E1 | 3.80 | 3.90 | 4.00 |
| e | 1.27 BSC | | |
| h | 0.25 | | 0.50 |
| L | 0.40 | | 1.27 |
| θ | 0° | | 8° |

TOP VIEW



SIDE VIEW



END VIEW

Notes:

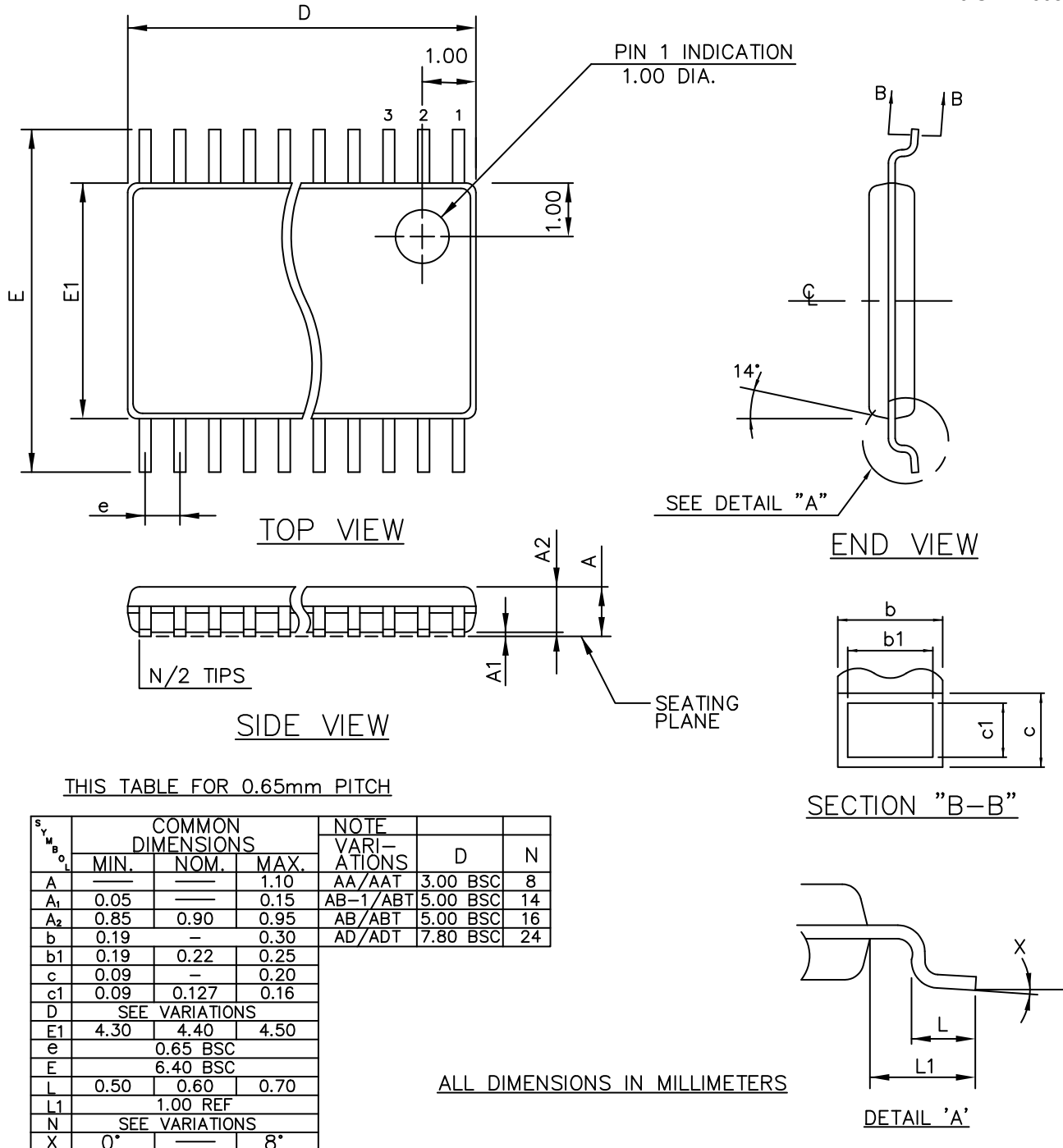
- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MS-012.

| | | |
|-------------------------|--------------------------|---|
| DOCUMENT NUMBER: | 98AON34275E | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION: | SOIC-16, 150 mils | PAGE 1 OF 1 |

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

TSSOP 16
CASE 948AH
ISSUE O

DATE 19 SEP 2008



MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15mm ON D PER SIDE

| | | |
|-------------------------|--------------------|---|
| DOCUMENT NUMBER: | 98AON34923E | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION: | TSSOP 16 | PAGE 1 OF 1 |

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

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

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[onsemi:](#)

[74VHC139SJX](#) [74VHC139N](#) [74VHC139M](#) [74VHC139MX](#) [74VHC139MTC](#) [74VHC139MTCX](#)