

NSS35200MR6T1G

35 V, 5 A, Low $V_{CE(sat)}$ PNP Transistor

ON Semiconductor's e²PowerEdge family of low $V_{CE(sat)}$ transistors are miniature surface mount devices featuring ultra low saturation voltage ($V_{CE(sat)}$) and high current gain capability. These are designed for use in low voltage, high speed switching applications where affordable efficient energy control is important.

Typical application are DC-DC converters and power management in portable and battery powered products such as cellular and cordless phones, PDAs, computers, printers, digital cameras and MP3 players. Other applications are low voltage motor controls in mass storage products such as disc drives and tape drives. In the automotive industry they can be used in air bag deployment and in the instrument cluster. The high current gain allows e²PowerEdge devices to be driven directly from PMU's control outputs, and the Linear Gain (Beta) makes them ideal components in analog amplifiers.

Features

- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant*

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

| Rating | Symbol | Max | Unit |
|--------------------------------|-----------|---------------------------|------|
| Collector-Emitter Voltage | V_{CEO} | -35 | Vdc |
| Collector-Base Voltage | V_{CBO} | -55 | Vdc |
| Emitter-Base Voltage | V_{EBO} | -5.0 | Vdc |
| Collector Current - Continuous | I_C | -2.0 | Adc |
| Collector Current - Peak | I_{CM} | -5.0 | A |
| Electrostatic Discharge | ESD | HBM Class 3 MM Class 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.

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



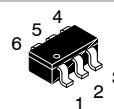
ON Semiconductor®

<http://onsemi.com>

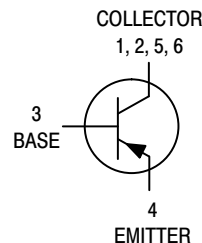
35 VOLTS

5.0 AMPS

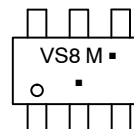
PNP LOW $V_{CE(sat)}$ TRANSISTOR
EQUIVALENT $R_{DS(on)}$ 100 m Ω



TSOP-6
CASE 318G
STYLE 6



MARKING DIAGRAM



VS8 = Device Code
M = Date Code*
▪ = Pb-Free Package

(*Note: Microdot may be in either location)
*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

| Device | Package | Shipping† |
|-----------------|---------------------|------------------------|
| NSS35200MR6T1G | TSOP-6 (Pb-Free) | 3,000 / Tape & Reel |
| SNSS35200MR6T1G | TSOP-6 (Pb-Free) | 3,000 / 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.

NSS35200MR6T1G

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|---------------------------------------|-------------|----------------------------|
| Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D (Note 1) | 625 5.0 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ (Note 1) | 200 | $^\circ\text{C/W}$ |
| Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D (Note 2) | 1.0 8.0 | W mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ (Note 2) | 120 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Lead #1 | $R_{\theta JL}$ | 80 | $^\circ\text{C/W}$ |
| Total Device Dissipation (Single Pulse < 10 sec.) | $P_{D\text{single}}$ (Notes 2 & 3) | 1.75 | W |
| Junction and Storage Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

1. FR-4 @ Minimum Pad.
2. FR-4 @ 1.0 X 1.0 inch Pad.
3. Refer to Figure 8.

NSS35200MR6T1G

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typical | Max | Unit |
|--|----------------------|-------------------|----------------------------|-------------------------|------|
| OFF CHARACTERISTICS | | | | | |
| Collector – Emitter Breakdown Voltage (I _C = -10 mAdc, I _B = 0) | V _{(BR)CEO} | -35 | -45 | - | Vdc |
| Collector – Base Breakdown Voltage (I _C = -0.1 mAdc, I _E = 0) | V _{(BR)CBO} | -55 | -65 | - | Vdc |
| Emitter – Base Breakdown Voltage (I _E = -0.1 mAdc, I _C = 0) | V _{(BR)EBO} | -5.0 | -7.0 | - | Vdc |
| Collector Cutoff Current (V _{CB} = -35 Vdc, I _E = 0) | I _{CBO} | - | -0.03 | -0.1 | μAdc |
| Collector – Emitter Cutoff Current (V _{CES} = -35 Vdc) | I _{CES} | - | -0.03 | -0.1 | μAdc |
| Emitter Cutoff Current (V _{EB} = -4.0 Vdc) | I _{EBO} | - | -0.01 | -0.1 | μAdc |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain (Note 4) (I _C = -1.0 A, V _{CE} = -1.5 V) (I _C = -1.5 A, V _{CE} = -1.5 V) (I _C = -2.0 A, V _{CE} = -3.0 V) | h _{FE} | 100 100 100 | 200 200 200 | - 400 - | |
| Collector – Emitter Saturation Voltage (Note 4) (I _C = -0.8 A, I _B = -0.008 A) (I _C = -1.2 A, I _B = -0.012 A) (I _C = -2.0 A, I _B = -0.02 A) | V _{CE(sat)} | - - - | -0.125 -0.175 -0.260 | -0.15 -0.20 -0.31 | V |
| Base – Emitter Saturation Voltage (Note 4) (I _C = -1.2 A, I _B = -0.012 A) | V _{BE(sat)} | - | -0.68 | -0.85 | V |
| Base – Emitter Turn-on Voltage (Note 4) (I _C = -2.0 A, V _{CE} = -3.0 V) | V _{BE(on)} | - | -0.81 | -0.875 | V |
| Cutoff Frequency (I _C = -100 mA, V _{CE} = -5.0 V, f = 100 MHz) | f _T | 100 | - | - | MHz |
| Input Capacitance (V _{EB} = -0.5 V, f = 1.0 MHz) | C _{ibo} | - | 600 | 650 | pF |
| Output Capacitance (V _{CB} = -3.0 V, f = 1.0 MHz) | C _{obo} | - | 85 | 100 | pF |
| Turn-on Time (V _{CC} = -10 V, I _{B1} = -100 mA, I _C = -1 A, R _L = 3 Ω) | t _{on} | - | 35 | - | nS |
| Turn-off Time (V _{CC} = -10 V, I _{B1} = I _{B2} = -100 mA, I _C = 1 A, R _L = 3 Ω) | t _{off} | - | 225 | - | nS |

4. Pulsed Condition: Pulse Width = 300 μsec, Duty Cycle ≤ 2%.

NSS35200MR6T1G

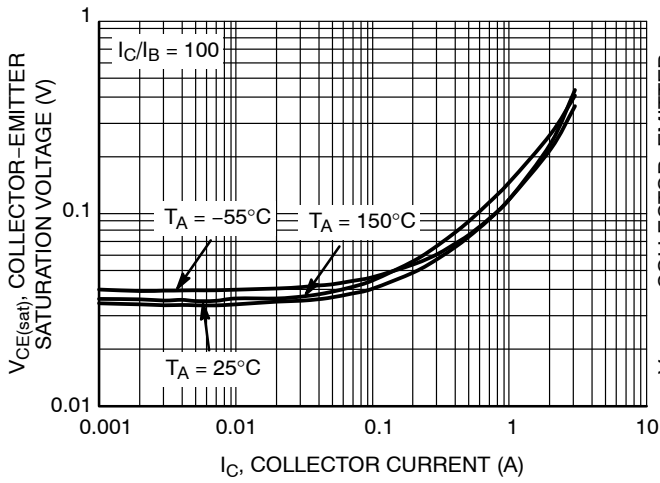


Figure 1. Collector Emitter Saturation Voltage versus Collector Current

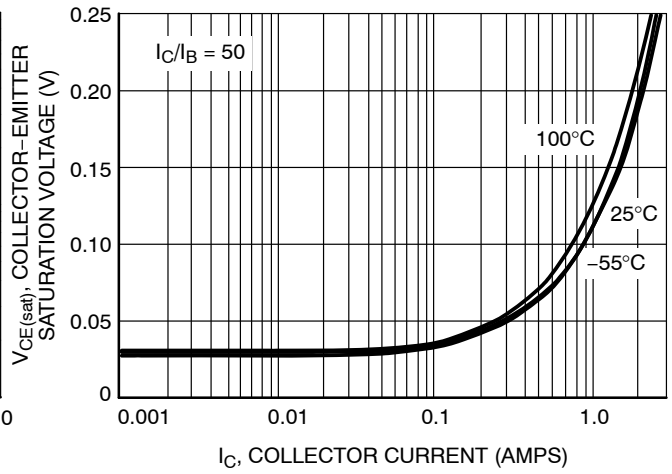


Figure 2. Collector Emitter Saturation Voltage versus Collector Current

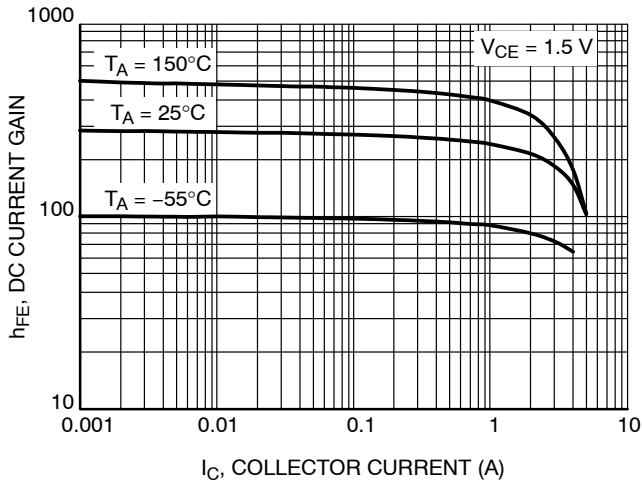


Figure 3. DC Current Gain versus Collector Current

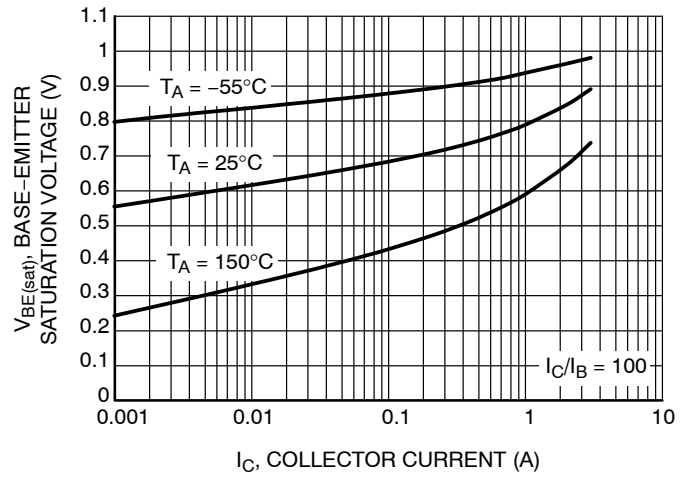


Figure 4. Base Emitter Saturation Voltage versus Collector Current

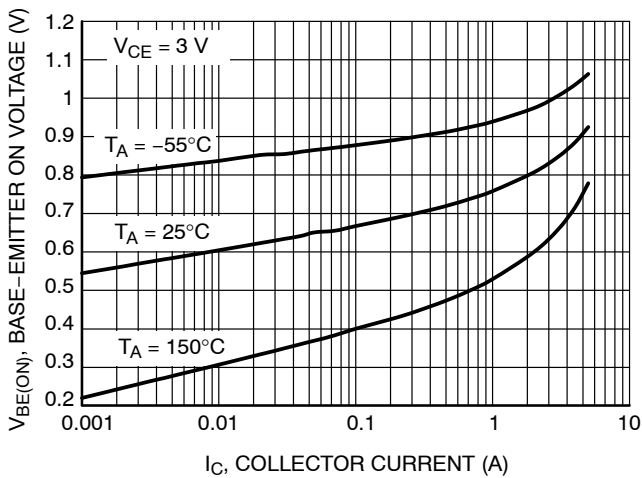


Figure 5. Base Emitter Turn-On Voltage versus Collector Current

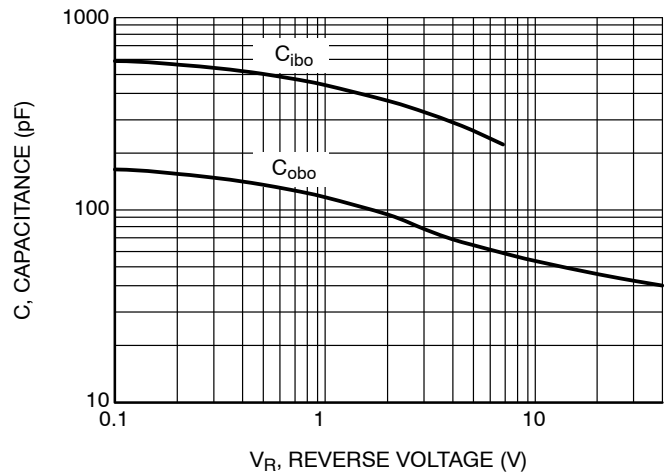


Figure 6. Capacitance

NSS35200MR6T1G

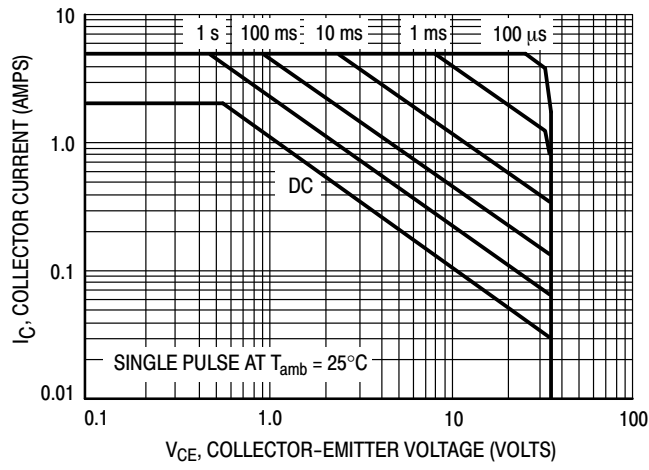


Figure 7. Safe Operating Area

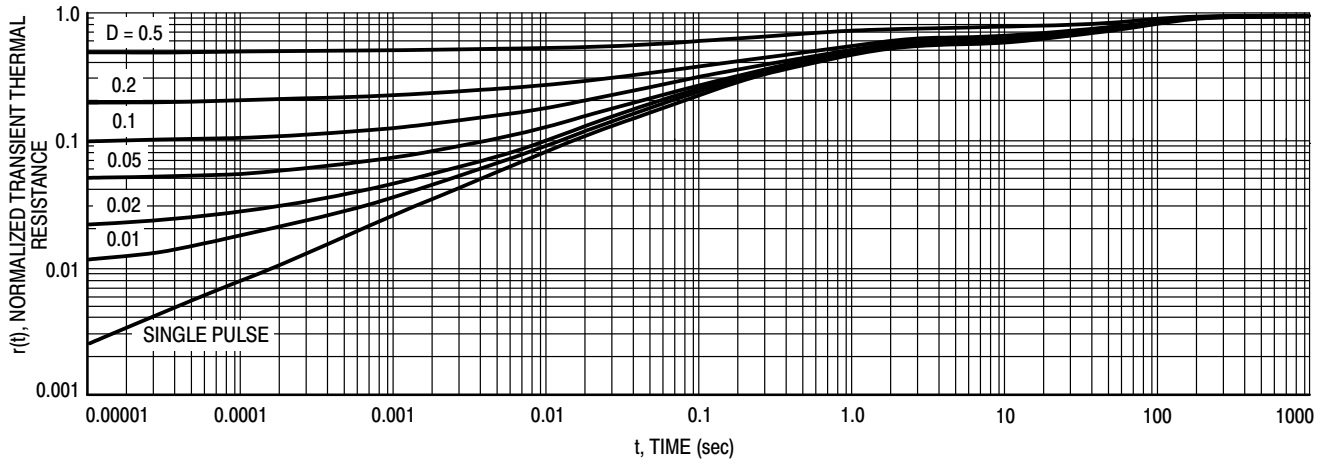


Figure 8. Normalized Thermal Response

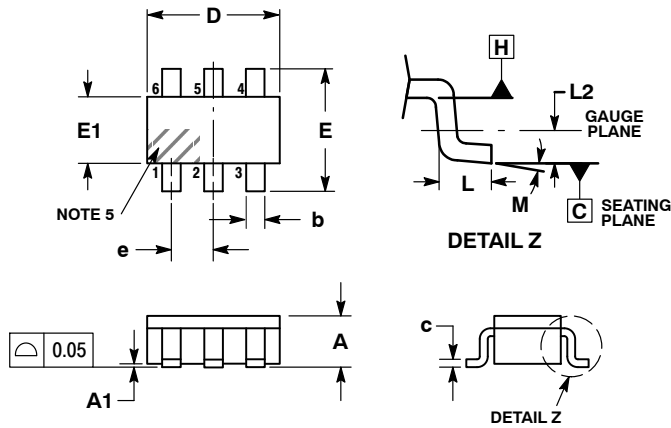
MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 2:1

TSOP-6 CASE 318G-02 ISSUE V

DATE 12 JUN 2012



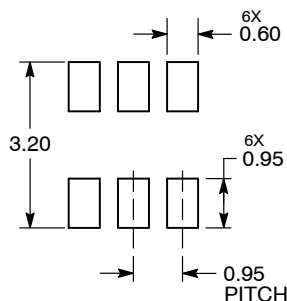
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
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 E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

| DIM | MILLIMETERS | | |
|-----|-------------|------|------|
| | MIN | NOM | MAX |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0.01 | 0.06 | 0.10 |
| b | 0.25 | 0.38 | 0.50 |
| c | 0.10 | 0.18 | 0.26 |
| D | 2.90 | 3.00 | 3.10 |
| E | 2.50 | 2.75 | 3.00 |
| E1 | 1.30 | 1.50 | 1.70 |
| e | 0.85 | 0.95 | 1.05 |
| L | 0.20 | 0.40 | 0.60 |
| L2 | 0.25 BSC | | |
| M | 0° | - | 10° |

- | | | | | | |
|--|--|---|---|---|--|
| <p>STYLE 1: PIN 1. DRAIN 2. DRAIN 3. GATE 4. SOURCE 5. DRAIN 6. DRAIN</p> | <p>STYLE 2: PIN 1. EMITTER 2 2. BASE 1 3. COLLECTOR 1 4. EMITTER 1 5. BASE 2 6. COLLECTOR 2</p> | <p>STYLE 3: PIN 1. ENABLE 2. N/C 3. R BOOST 4. Vz 5. V in 6. V out</p> | <p>STYLE 4: PIN 1. N/C 2. V in 3. NOT USED 4. GROUND 5. ENABLE 6. LOAD</p> | <p>STYLE 5: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2</p> | <p>STYLE 6: PIN 1. COLLECTOR 2. COLLECTOR 3. BASE 4. EMITTER 5. COLLECTOR 6. COLLECTOR</p> |
| <p>STYLE 7: PIN 1. COLLECTOR 2. COLLECTOR 3. BASE 4. N/C 5. COLLECTOR 6. EMITTER</p> | <p>STYLE 8: PIN 1. Vbus 2. D(in) 3. D(in)+ 4. D(out)+ 5. D(out) 6. GND</p> | <p>STYLE 9: PIN 1. LOW VOLTAGE GATE 2. DRAIN 3. SOURCE 4. DRAIN 5. DRAIN 6. HIGH VOLTAGE GATE</p> | <p>STYLE 10: PIN 1. D(OUT)+ 2. GND 3. D(OUT)- 4. D(IN)- 5. VBUS 6. D(IN)+</p> | <p>STYLE 11: PIN 1. SOURCE 1 2. DRAIN 2 3. DRAIN 2 4. SOURCE 2 5. GATE 1 6. DRAIN 1/GATE 2</p> | <p>STYLE 12: PIN 1. I/O 2. GROUND 3. I/O 4. I/O 5. VCC 6. I/O</p> |
| <p>STYLE 13: PIN 1. GATE 1 2. SOURCE 2 3. GATE 2 4. DRAIN 2 5. SOURCE 1 6. DRAIN 1</p> | <p>STYLE 14: PIN 1. ANODE 2. SOURCE 3. GATE 4. CATHODE/DRAIN 5. CATHODE/DRAIN 6. CATHODE/DRAIN</p> | <p>STYLE 15: PIN 1. ANODE 2. SOURCE 3. GATE 4. DRAIN 5. N/C 6. CATHODE</p> | <p>STYLE 16: PIN 1. ANODE/CATHODE 2. BASE 3. EMITTER 4. COLLECTOR 5. ANODE 6. CATHODE</p> | <p>STYLE 17: PIN 1. EMITTER 2. BASE 3. ANODE/CATHODE 4. ANODE 5. CATHODE 6. COLLECTOR</p> | |

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

GENERIC MARKING DIAGRAM*



IC

STANDARD

- | | |
|----------------------------|----------------------------|
| XXX = Specific Device Code | XXX = Specific Device Code |
| A = Assembly Location | M = Date Code |
| Y = Year | ▪ = Pb-Free Package |
| W = Work Week | |
| ▪ = Pb-Free Package | |

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

*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.

| | | |
|------------------|-------------|--|
| DOCUMENT NUMBER: | 98ASB14888C | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION: | TSOP-6 | 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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative