

NTND31200PZ

Small Signal MOSFET

-20 V, -127 mA, Dual P-Channel,
0.65 mm x 0.90 mm x 0.4 mm XLLGA6
Package



ON Semiconductor®

www.onsemi.com

Features

- Dual P-Channel MOSFET
- Offers a Low $R_{DS(ON)}$ Solution in the Ultra Small 0.65 mm x 0.90 mm Package
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Small Signal Load Switch
- Analog Switch
- High Speed Interfacing
- Optimized for Power Management in Ultra Portable Products

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

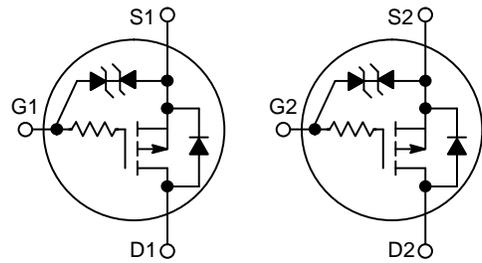
| Parameter | | | Symbol | Value | Unit |
|---|--------------|--------------------------|----------------------|---------------|------------------|
| Drain-to-Source Voltage | | | V_{DSS} | -20 | V |
| Gate-to-Source Voltage | | | V_{GS} | ± 8 | V |
| Continuous Drain Current (Note 1) | Steady State | $T_A = 25^\circ\text{C}$ | I_D | -127 | mA |
| | | $T_A = 85^\circ\text{C}$ | | -91 | |
| | $t \leq 5$ s | $T_A = 25^\circ\text{C}$ | | -146 | |
| Power Dissipation (Note 1) | Steady State | $T_A = 25^\circ\text{C}$ | P_D | 125 | mW |
| | $t \leq 5$ s | | | 166 | |
| Pulsed Drain Current | | $t_p = 10$ μs | I_{DM} | -488 | mA |
| Operating Junction and Storage Temperature | | | T_J , T_{STG} | -55 to 150 | $^\circ\text{C}$ |
| Source Current (Body Diode) (Note 2) | | | I_S | -200 | mA |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | | | T_L | 260 | $^\circ\text{C}$ |

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. Surface-mounted on FR4 board using the minimum recommended pad size, 1 oz Cu.
2. Pulse Test: pulse width ≤ 300 μs , duty cycle $\leq 2\%$

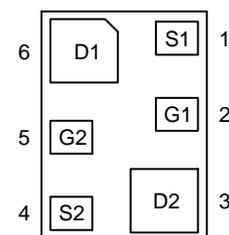
| $V_{(BR)DSS}$ | $R_{DS(ON)}$ MAX | I_D Max |
|---------------|------------------------|-----------|
| -20 V | 5.0 Ω @ -4.5 V | -127 mA |
| | 6.0 Ω @ -2.5 V | |
| | 7.0 Ω @ -1.8 V | |
| | 10.0 Ω @ -1.5 V | |

P-Channel MOSFET



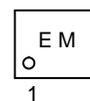
XLLGA6
Case 713AC

PINOUT DIAGRAM



(Bottom View)

MARKING DIAGRAM



E = Specific Device Code
M = Date Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

NTND31200PZ

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Max | Unit |
|--|-----------------|------------|----------------------|
| Junction-to-Ambient (Note 3) Steady State $t \leq 5$ s | $R_{\theta JA}$ | 998 751 | $^{\circ}\text{C/W}$ |

3. Surface-mounted on FR4 board using the minimum recommended pad size, 1 oz Cu.

ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}\text{C}$ unless otherwise specified)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|-----------|--------|----------------|-----|-----|-----|------|
|-----------|--------|----------------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | |
|-----------------------------------|---------------|--|----------------------------|--|-----------|----|
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0$ V, $I_D = -250$ μA | -20 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{GS} = 0$ V, $V_{DS} = -5$ V | $T_J = 25^{\circ}\text{C}$ | | -50 | nA |
| | | | $T_J = 85^{\circ}\text{C}$ | | -200 | nA |
| | | $V_{GS} = 0$ V, $V_{DS} = -16$ V | $T_J = 25^{\circ}\text{C}$ | | -100 | nA |
| Gate-to-Source Leakage Current | I_{GSS} | $V_{DS} = 0$ V, $V_{GS} = \pm 5.0$ V | | | ± 100 | nA |

ON CHARACTERISTICS

| | | | | | | |
|-------------------------------|--------------|--|------|------|------|----------|
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}$, $I_D = -250$ μA | -0.4 | | -1.0 | V |
| Drain-to-Source On Resistance | $R_{DS(ON)}$ | $V_{GS} = -4.5$ V, $I_D = -100$ mA | | 2.1 | 5.0 | Ω |
| | | $V_{GS} = -2.5$ V, $I_D = -50$ mA | | 2.7 | 6.0 | |
| | | $V_{GS} = -1.8$ V, $I_D = -20$ mA | | 3.4 | 7.0 | |
| | | $V_{GS} = -1.5$ V, $I_D = -10$ mA | | 4.2 | 10.0 | |
| Forward Transconductance | g_{FS} | $V_{DS} = -5.0$ V, $I_D = -125$ mA | | 0.35 | | S |
| Forward Diode Voltage | V_{SD} | $V_{GS} = 0$ V, $I_S = -10$ mA | | -0.6 | -1.0 | V |

CAPACITANCES

| | | | | | | |
|------------------------------|-----------|---|--|------|--|----|
| Input Capacitance | C_{ISS} | $V_{GS} = 0$ V, $f = 1$ MHz, $V_{DS} = -15$ V | | 12.8 | | pF |
| Output Capacitance | C_{OSS} | | | 2.8 | | |
| Reverse Transfer Capacitance | C_{RSS} | | | 2.0 | | |

SWITCHING CHARACTERISTICS, $V_{GS} = 4.5$ V

| | | | | | | |
|---------------------|--------------|---|--|-----|--|----|
| Turn-On Delay Time | $t_{d(ON)}$ | $V_{GS} = -4.5$ V, $V_{DD} = -15$ V, $I_D = -200$ mA, $R_G = 2.0$ Ω | | 37 | | ns |
| Rise Time | t_r | | | 71 | | |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | | 280 | | |
| Fall Time | t_f | | | 171 | | |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

ORDERING INFORMATION

| Device | Package | Shipping† |
|----------------|---------------------|--------------------|
| NTND31200PZTAG | XLLGA6 (Pb-Free) | 8000 / 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.

NTND31200PZ

TYPICAL CHARACTERISTICS

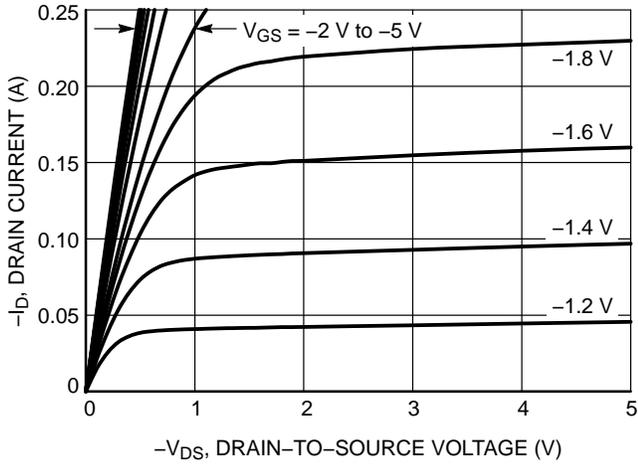


Figure 1. On-Region Characteristics

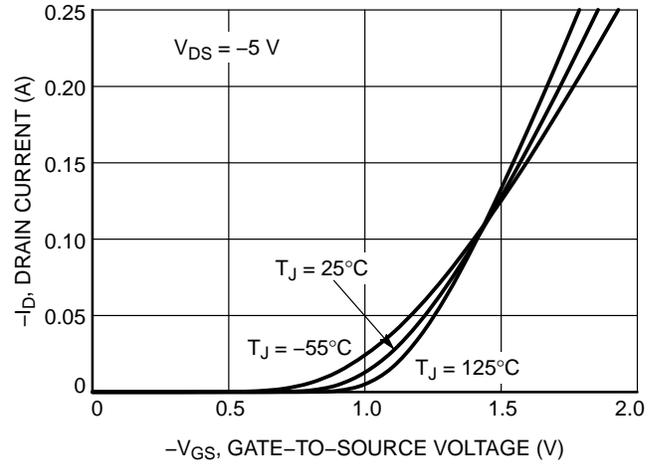


Figure 2. Transfer Characteristics

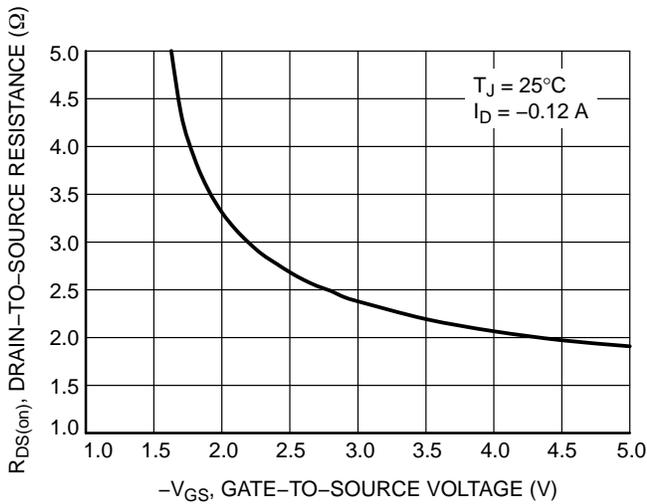


Figure 3. On-Resistance vs. Gate-to-Source Voltage

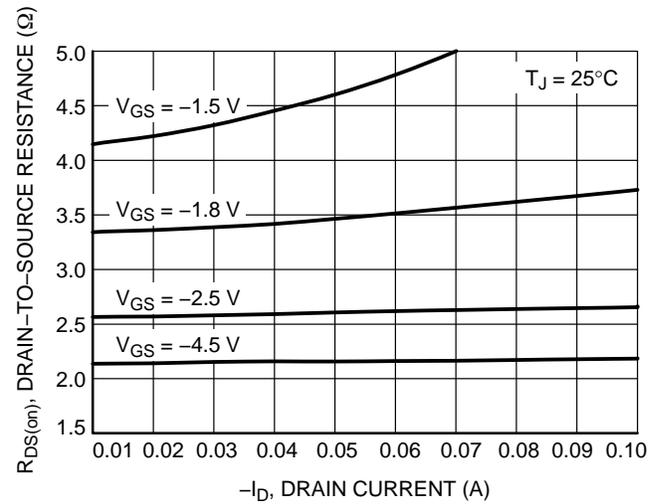


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

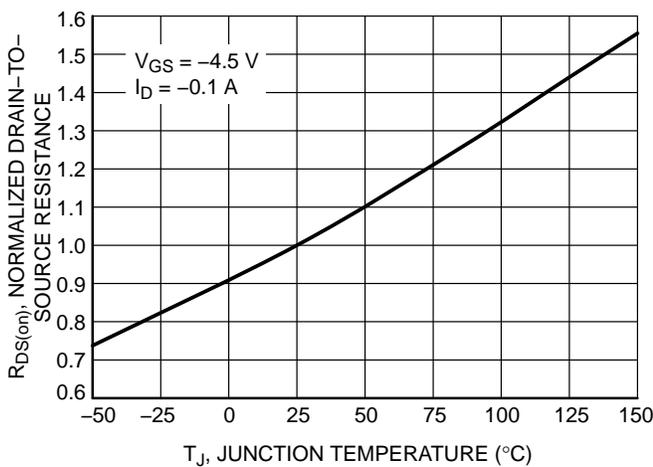


Figure 5. On-Resistance Variation with Temperature

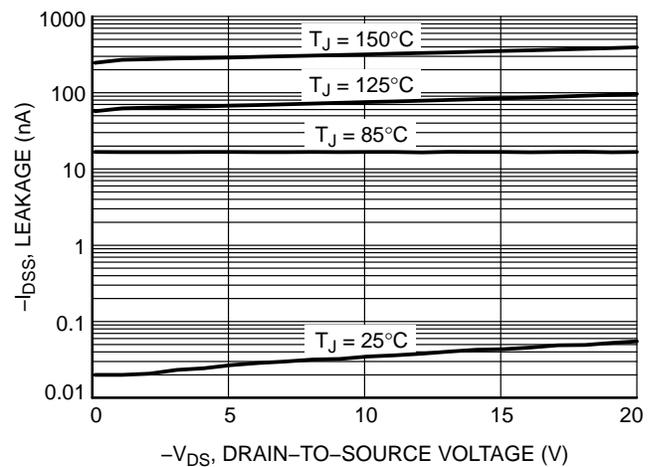


Figure 6. Drain-to-Source Leakage Current vs. Voltage

NTND31200PZ

TYPICAL CHARACTERISTICS

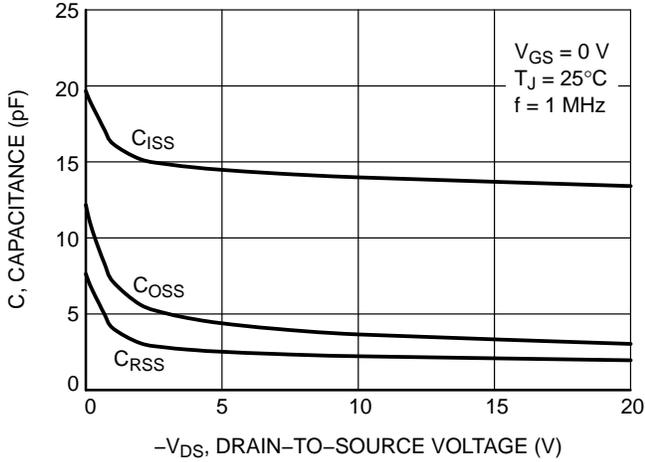


Figure 7. Capacitance Variation

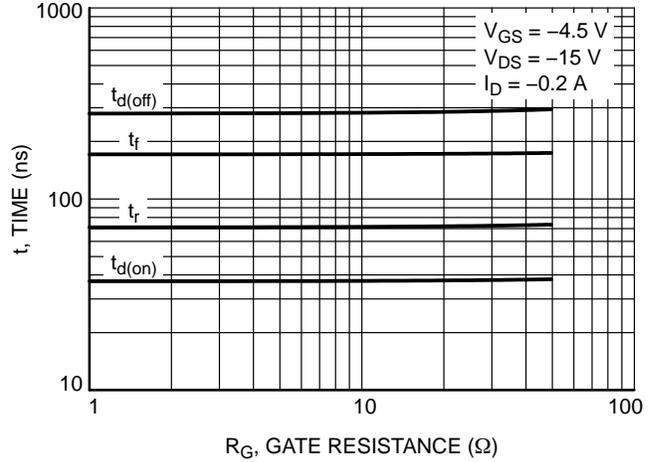


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

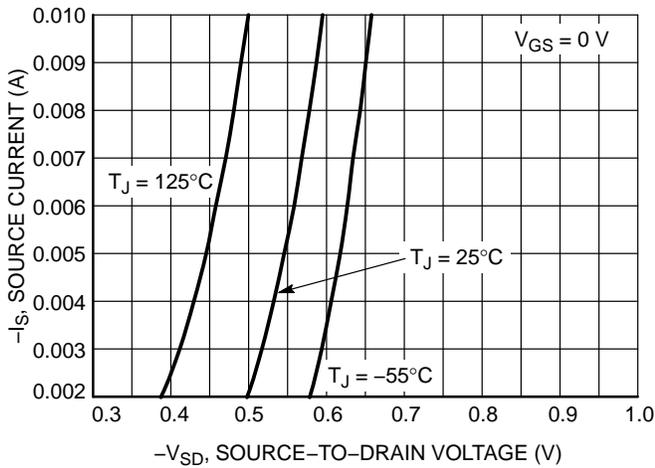


Figure 9. Diode Forward Voltage vs. Current

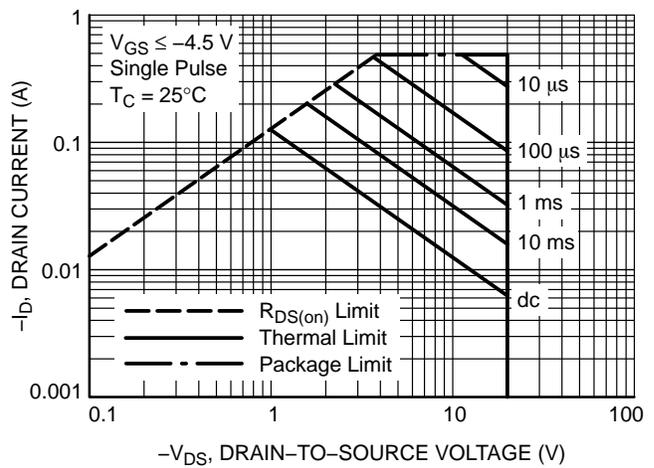


Figure 10. Maximum Rated Forward Biased Safe Operating Area

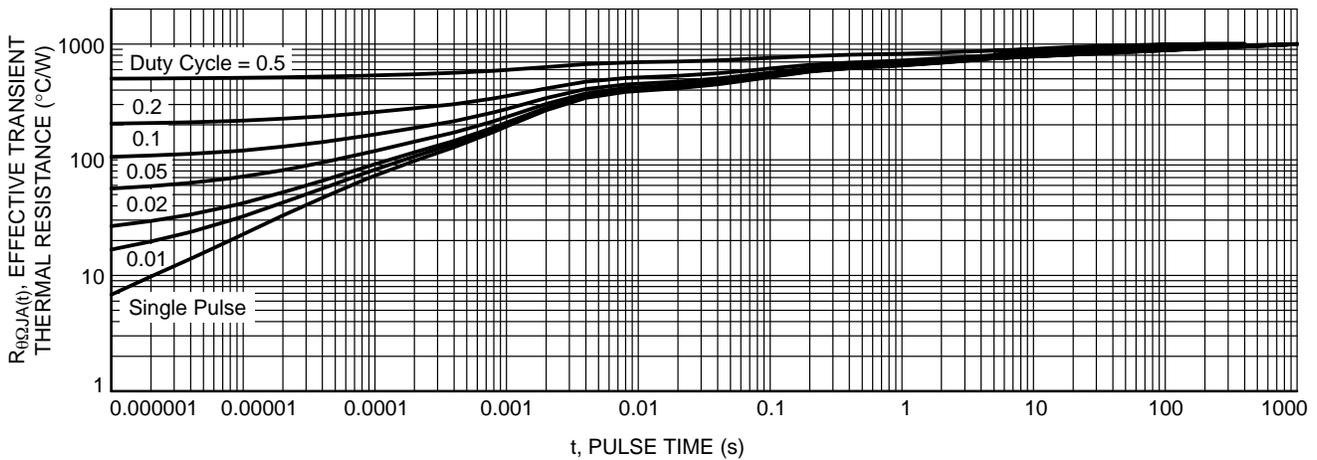
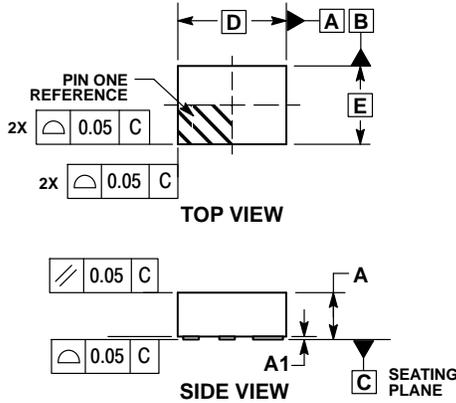


Figure 11. Thermal Response

NTND31200PZ

PACKAGE DIMENSIONS

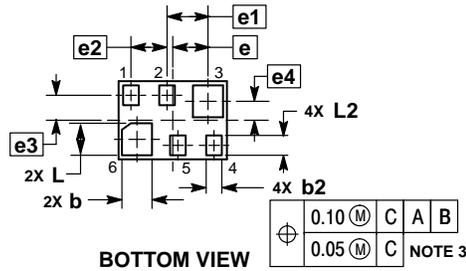
XLLGA6 0.90x0.65
CASE 713AC
ISSUE O



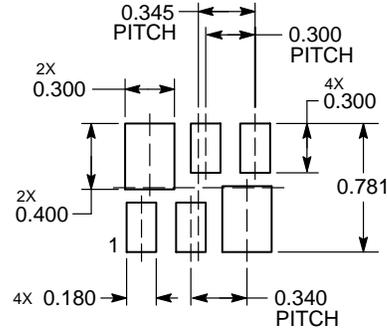
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. POSITIONAL TOLERANCE APPLIES TO ALL SIX LEADS.

| DIM | MILLIMETERS | |
|-----|-------------|-------|
| | MIN | MAX |
| A | 0.340 | 0.440 |
| A1 | 0.000 | 0.050 |
| b | 0.200 | 0.300 |
| b2 | 0.080 | 0.180 |
| D | 0.900 BSC | |
| E | 0.650 BSC | |
| e | 0.295 BSC | |
| e1 | 0.340 BSC | |
| e2 | 0.300 BSC | |
| e3 | 0.208 BSC | |
| e4 | 0.158 BSC | |
| L | 0.215 | 0.315 |
| L2 | 0.115 | 0.215 |



RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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

ON Semiconductor and the are registered trademarks of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries. SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC 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 SCILLC was negligent regarding the design or manufacture of the part. SCILLC 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:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com
Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative