

NTNS3164NZ

Advance Information Small Signal MOSFET

20 V, 245 mA, Single N-Channel,
SOT-883 (XDFN3) 1.0 x 0.6 x 0.4 mm
Package

Features

- Single N-Channel MOSFET
- Ultra Low Profile SOT-883 (XDFN3) 1.0 x 0.6 x 0.4 mm for Extremely Thin Environments Such as Portable Electronics
- Low $R_{DS(on)}$ Solution in the Ultra Small 1.0 x 0.6 mm Package
- 1.5 V Gate Drive
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- High Side Switch
- High Speed Interfacing
- Optimized for Power Management in Ultra Portable Solutions

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

| 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 | 245 | mA |
| | | | | $T_A = 85^\circ\text{C}$ | |
| | $t \leq 5 \text{ s}$ | $T_A = 25^\circ\text{C}$ | 287 | | |
| Power Dissipation (Note 1) | Steady State | $T_A = 25^\circ\text{C}$ | P_D | 154 | mW |
| | | | | $t \leq 5 \text{ s}$ | |
| Pulsed Drain Current | $t_p = 10 \mu\text{s}$ | I_{DM} | 732 | mA | |
| Operating Junction and Storage Temperature | | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ | |
| Source Current (Body Diode) (Note 2) | | I_S | 128 | mA | |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | | T_L | 260 | $^\circ\text{C}$ | |

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.

1. Surface-mounted on FR4 board using the minimum recommended pad size, or 2 mm², 1 oz Cu.
2. Pulse Test: pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$

This document contains information on a new product. Specifications and information herein are subject to change without notice.

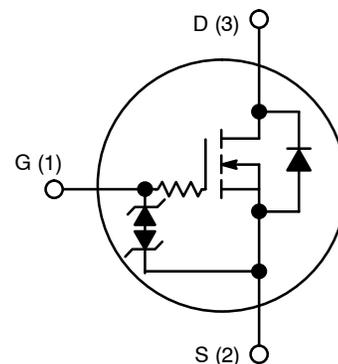


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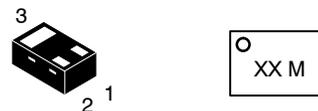
<http://onsemi.com>

| $V_{(BR)DSS}$ | $R_{DS(on)}$ MAX | I_D Max |
|---------------|----------------------|-----------|
| 20 V | 1.5 Ω @ 4.5 V | 245 mA |
| | 2.0 Ω @ 2.5 V | |
| | 4.0 Ω @ 1.8 V | |
| | 6.8 Ω @ 1.5 V | |

N-CHANNEL MOSFET



MARKING DIAGRAM



SOT-883 (XDFN3)
CASE 506CB

XX = Specific Device Code
M = Date Code

ORDERING INFORMATION

| Device | Package | Shipping† |
|---------------|-------------------|--------------------|
| NTNS3164NZT5G | SOT-883 (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 Specification Brochure, BRD8011/D.

NTNS3164NZ

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Max | Unit |
|---|-----------------|-----|------|
| Junction-to-Ambient – Steady State (Note 3) | $R_{\theta JA}$ | 814 | °C/W |
| Junction-to-Ambient – $t \leq 5$ s (Note 3) | $R_{\theta JA}$ | 589 | |

3. Surface-mounted on FR4 board using the minimum recommended pad size, or 2 mm², 1 oz Cu.

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

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

OFF CHARACTERISTICS

| | | | | | | |
|---|-------------------|---|----|----|----------|---------------|
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$ | 20 | | | V |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | $I_D = 250\ \mu\text{A}$, ref to 25°C | | 20 | | mV/°C |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}, T_J = 25^\circ\text{C}$ | | | 1 | μA |
| Gate-to-Source Leakage Current | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 5\text{ V}$ | | | ± 10 | μA |

ON CHARACTERISTICS (Note 4)

| | | | | | | |
|--|------------------|--|-----|------|-----|----------|
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$ | 0.4 | | 1.0 | V |
| Negative Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ | | | 1.7 | | mV/°C |
| Drain-to-Source On Resistance | $R_{DS(on)}$ | $V_{GS} = 4.5\text{ V}, I_D = 200\text{ mA}$ | | 0.5 | 1.5 | Ω |
| | | $V_{GS} = 2.5\text{ V}, I_D = 100\text{ mA}$ | | 0.7 | 2.0 | |
| | | $V_{GS} = 1.8\text{ V}, I_D = 50\text{ mA}$ | | 1.0 | 4.0 | |
| | | $V_{GS} = 1.5\text{ V}, I_D = 10\text{ mA}$ | | 1.3 | 6.8 | |
| Source-Drain Diode Voltage | V_{SD} | $V_{GS} = 0\text{ V}, I_S = 100\text{ mA}$ | | 0.75 | 1.2 | V |

CHARGES & CAPACITANCES

| | | | | | | |
|------------------------------|--------------|---|--|-----|--|----|
| Input Capacitance | C_{ISS} | $V_{GS} = 0\text{ V}$, freq = 1 MHz, $V_{DS} = 10\text{ V}$ | | 23 | | pF |
| Output Capacitance | C_{OSS} | | | 5.0 | | |
| Reverse Transfer Capacitance | C_{RSS} | | | 3.3 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V};$ $I_D = 200\text{ mA}$ | | 0.8 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | 0.1 | | |
| Gate-to-Source Charge | Q_{GS} | | | 0.2 | | |
| Gate-to-Drain Charge | Q_{GD} | | | 0.1 | | |

SWITCHING CHARACTERISTICS, $V_{GS} = 4.5\text{ V}$ (Note 4)

| | | | | | | |
|---------------------|--------------|--|--|----|--|----|
| Turn-On Delay Time | $t_{d(ON)}$ | $V_{GS} = 4.5\text{ V}, V_{DD} = 10\text{ V},$ $I_D = 200\text{ mA}, R_G = 2\ \Omega$ | | 12 | | ns |
| Rise Time | t_r | | | 17 | | |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | | 90 | | |
| Fall Time | t_f | | | 42 | | |

4. Switching characteristics are independent of operating junction temperatures

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TYPICAL CHARACTERISTICS

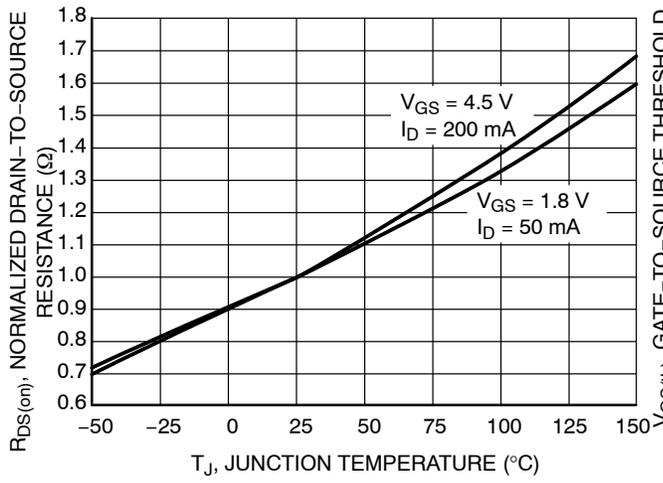


Figure 1. On Resistance Variation with Temperature

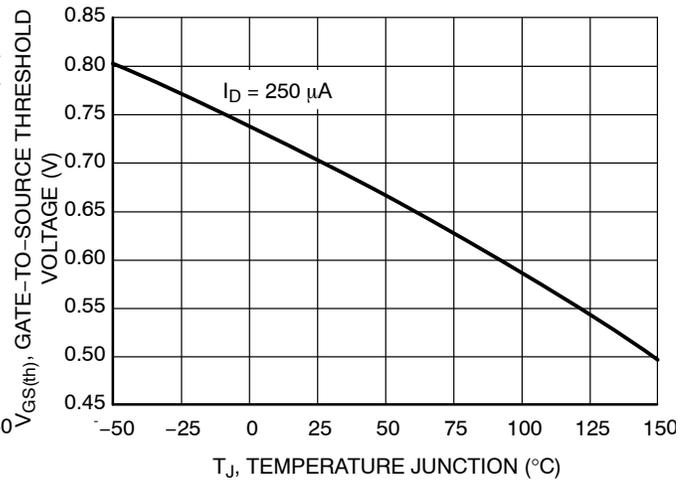
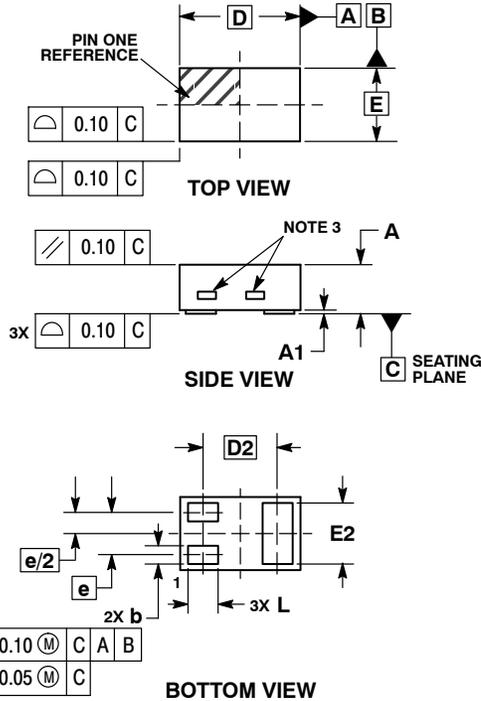


Figure 2. Threshold Voltage

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PACKAGE DIMENSIONS

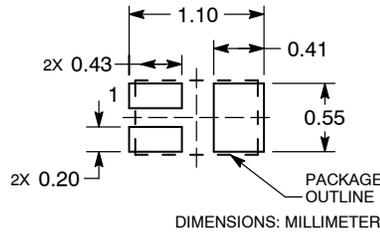
SOT-883 (XDFN3), 1.0x0.6, 0.35P
CASE 506CB
ISSUE A



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. EXPOSED COPPER ALLOWED AS SHOWN.

| MILLIMETERS | | |
|-------------|-----------|-------|
| DIM | MIN | MAX |
| A | 0.340 | 0.440 |
| A1 | 0.000 | 0.030 |
| b | 0.075 | 0.200 |
| D | 0.950 | 1.075 |
| D2 | 0.620 BSC | |
| e | 0.350 BSC | |
| E | 0.550 | 0.675 |
| E2 | 0.425 | 0.550 |
| L | 0.170 | 0.300 |

RECOMMENDED SOLDER FOOTPRINT*



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

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