

# NTNS3A65PZ

## MOSFET – Single, P-Channel, Small Signal, SOT-883 (XDFN3), 1.0 x 0.6 x 0.4 mm -20 V, -281 mA

### Features

- Single P-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   |                        | $V_{DS}$                 | -20                      | V                    |    |
| Gate-to-Source Voltage  |                        | $V_{GS}$                 | $\pm 8$                  | V                    |    |
| Continuous Drain Current (Note 1)                                 | Steady State           | $I_D$                    | $T_A = 25^\circ\text{C}$ | -281                 | mA |
|   |                        |                          | $T_A = 85^\circ\text{C}$ | -202                 |    |
|   | $t \leq 5 \text{ s}$   | $T_A = 25^\circ\text{C}$ | -332                     |                      |    |
| Power Dissipation (Note 1)  | Steady State           | $P_D$                    | $T_A = 25^\circ\text{C}$ |                      | mW |
|   |                        |                          |                          | $t \leq 5 \text{ s}$ |    |
| Pulsed Drain Current  | $t_p = 10 \mu\text{s}$ | $I_{DM}$                 | -842                     | mA                   |    |
| Operating Junction and Storage Temperature                        |                        | $T_J, T_{STG}$           | -55 to 150               | $^\circ\text{C}$     |    |
| Source Current (Body Diode) (Note 2)                              |                        | $I_S$                    | -130                     | 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 mm<sup>2</sup>, 1 oz Cu.
2. Pulse Test: pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$

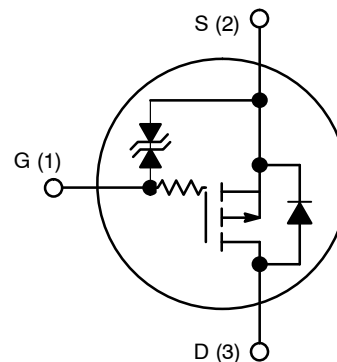


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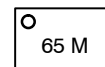
| $V_{(BR)DSS}$ | $R_{DS(on)}$ MAX      | $I_D$ Max |
|---------------|-----------------------|-----------|
| -20 V         | 1.3 $\Omega$ @ -4.5 V | -281 mA   |
|               | 2.0 $\Omega$ @ -2.5 V |           |
|               | 3.4 $\Omega$ @ -1.8 V |           |
|               | 4.5 $\Omega$ @ -1.5 V |           |

### P-CHANNEL MOSFET



SOT-883 (XDFN3)  
CASE 506CB

### MARKING DIAGRAM



65 = Specific Device Code  
M = Date Code

### ORDERING INFORMATION

| Device        | Package           | Shipping†          |
|---------------|-------------------|--------------------|
| NTNS3A65PZT5G | 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.

# NTNS3A65PZ

## THERMAL RESISTANCE RATINGS

| Parameter                                   | Symbol          | Max | Unit |
|---|-----------------|-----|------|
| Junction-to-Ambient – Steady State (Note 3) | $R_{\theta JA}$ | 804 | °C/W |
| Junction-to-Ambient – $t \leq 5$ s (Note 3) | $R_{\theta JA}$ | 574 |      |

3. Surface-mounted on FR4 board using the minimum recommended pad size, or 2 mm<sup>2</sup>, 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                         | $V_{(BR)DSS}$     | $V_{GS} = 0$ V, $I_D = -250$ $\mu$ A                       | -20 |    |          | V       |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | $I_D = -250$ $\mu$ A, ref to 25°C                          |     | 11 |          | mV/°C   |
| Zero Gate Voltage Drain Current                           | $I_{DSS}$         | $V_{GS} = 0$ V, $V_{DS} = -20$ V, $T_J = 25^\circ\text{C}$ |     |    | -1       | $\mu$ A |
| Gate-to-Source Leakage Current                            | $I_{GSS}$         | $V_{DS} = 0$ V, $V_{GS} = \pm 5$ V                         |     |    | $\pm 10$ | $\mu$ A |

### ON CHARACTERISTICS (Note 4)

|  |                  |  |      |      |      |          |
|--|------------------|--|------|------|------|----------|
| Gate Threshold Voltage                     | $V_{GS(TH)}$     | $V_{GS} = V_{DS}$ , $I_D = -250$ $\mu$ A | -0.4 |      | -1.0 | V        |
| Negative Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ |  |      | 2.2  |      | mV/°C    |
| Drain-to-Source On Resistance              | $R_{DS(on)}$     | $V_{GS} = -4.5$ V, $I_D = -200$ mA       |      | 0.9  | 1.3  | $\Omega$ |
|  |                  | $V_{GS} = -2.5$ V, $I_D = -100$ mA       |      | 1.3  | 2.0  |          |
|  |                  | $V_{GS} = -1.8$ V, $I_D = -50$ mA        |      | 1.8  | 3.4  |          |
|  |                  | $V_{GS} = -1.5$ V, $I_D = -10$ mA        |      | 2.3  | 4.5  | $\Omega$ |
| Forward Transconductance                   | $g_{FS}$         | $V_{DS} = -5$ V, $I_D = -200$ mA         |      | 0.58 |      | S        |
| Source-Drain Diode Voltage                 | $V_{SD}$         | $V_{GS} = 0$ V, $I_S = -100$ mA          |      | -0.8 | -1.2 | V        |

### CHARGES & CAPACITANCES

|                              |              |   |  |     |  |    |
|------------------------------|--------------|---|--|-----|--|----|
| Input Capacitance            | $C_{ISS}$    | $V_{GS} = 0$ V, freq = 1 MHz, $V_{DS} = -10$ V          |  | 44  |  | pF |
| Output Capacitance           | $C_{OSS}$    |   |  | 6.7 |  |    |
| Reverse Transfer Capacitance | $C_{RSS}$    |   |  | 5.5 |  |    |
| Total Gate Charge            | $Q_{G(TOT)}$ | $V_{GS} = -4.5$ V, $V_{DS} = -10$ V;<br>$I_D = -200$ mA |  | 1.1 |  | nC |
| Threshold Gate Charge        | $Q_{G(TH)}$  |   |  | 0.1 |  |    |
| Gate-to-Source Charge        | $Q_{GS}$     |   |  | 0.2 |  |    |
| Gate-to-Drain Charge         | $Q_{GD}$     |   |  | 0.2 |  |    |

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

|                     |              |   |  |     |  |    |
|---------------------|--------------|---|--|-----|--|----|
| Turn-On Delay Time  | $t_{d(ON)}$  | $V_{GS} = -4.5$ V, $V_{DD} = -10$ V,<br>$I_D = -200$ mA, $R_G = 2$ $\Omega$ |  | 18  |  | ns |
| Rise Time           | $t_r$        |   |  | 32  |  |    |
| Turn-Off Delay Time | $t_{d(OFF)}$ |   |  | 178 |  |    |
| Fall Time           | $t_f$        |   |  | 84  |  |    |

4. Switching characteristics are independent of operating junction temperatures

# NTNS3A65PZ

## TYPICAL CHARACTERISTICS

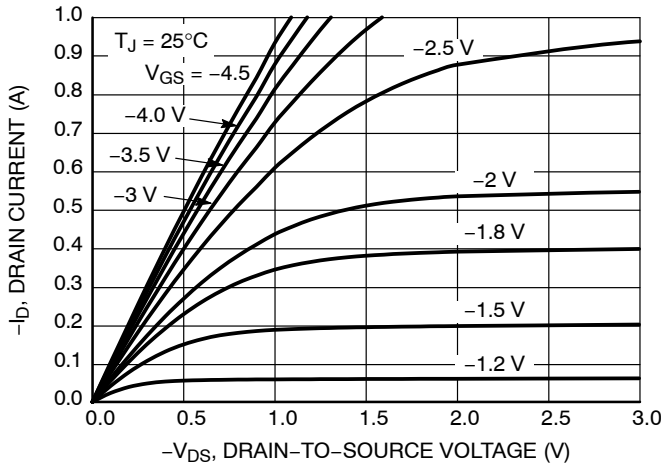


Figure 1. On-Region Characteristics

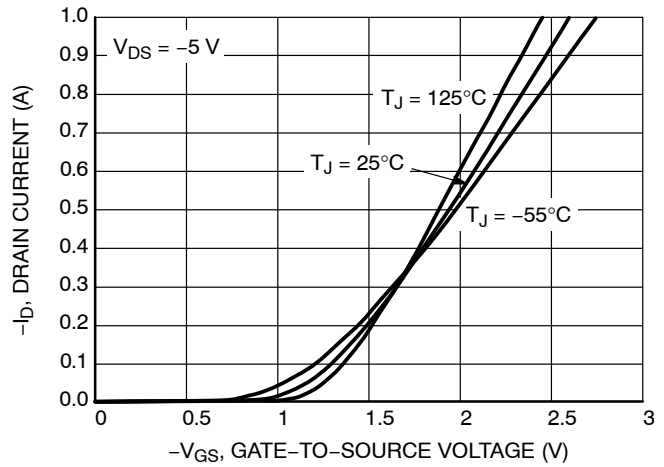


Figure 2. Transfer Characteristics

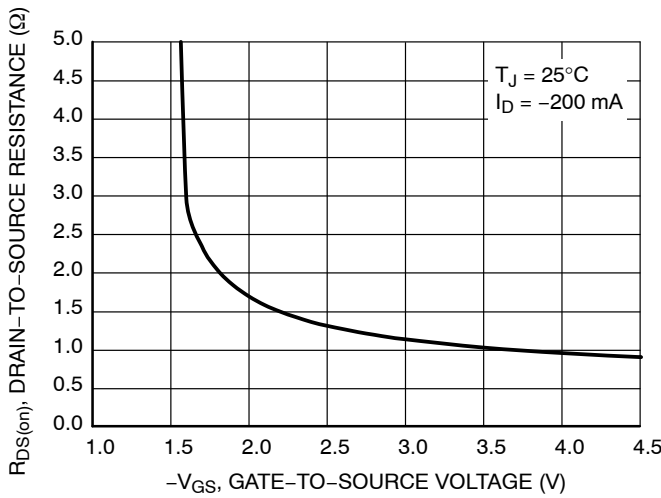


Figure 3. On-Resistance vs. Gate Voltage

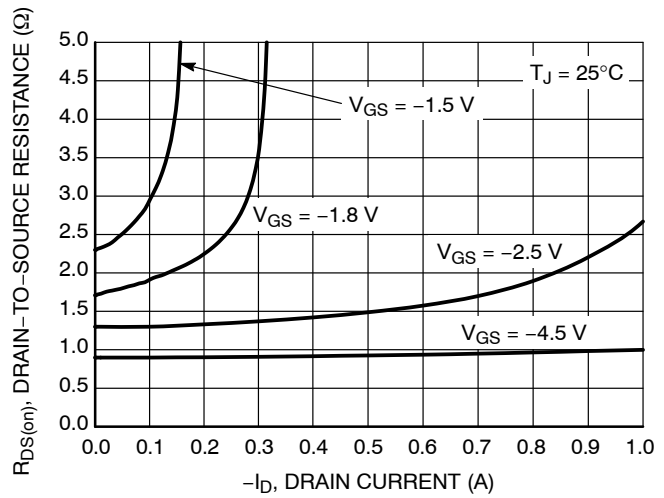


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

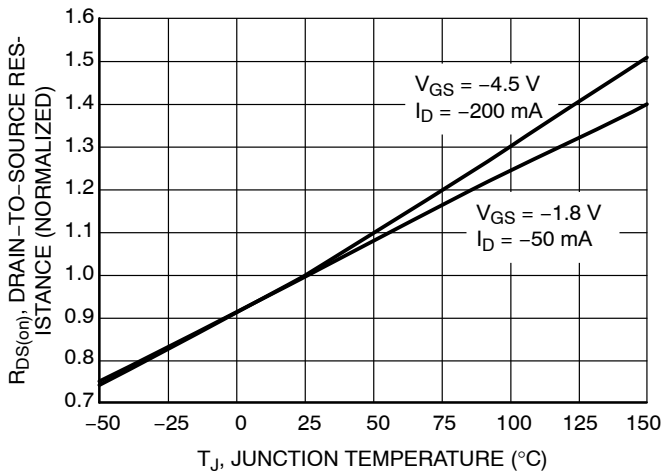


Figure 5. On-Resistance Variation with Temperature

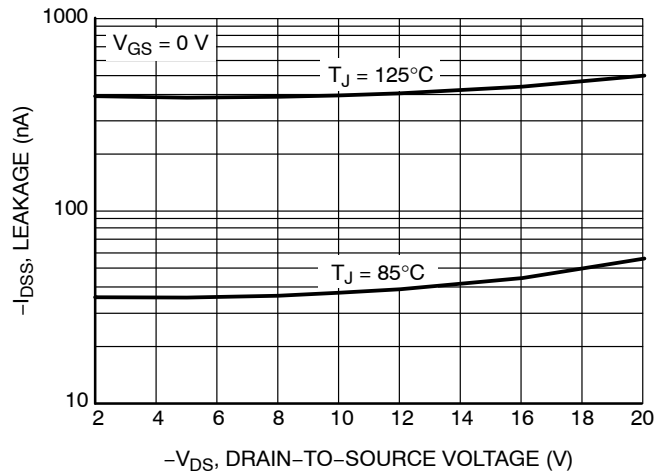


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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## TYPICAL CHARACTERISTICS

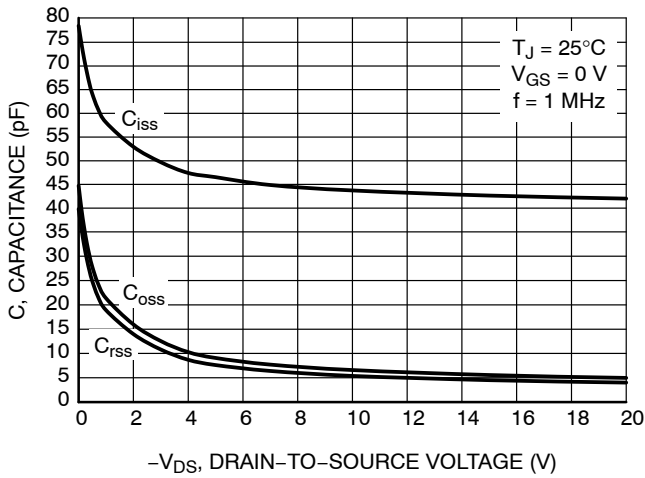


Figure 7. Capacitance Variation

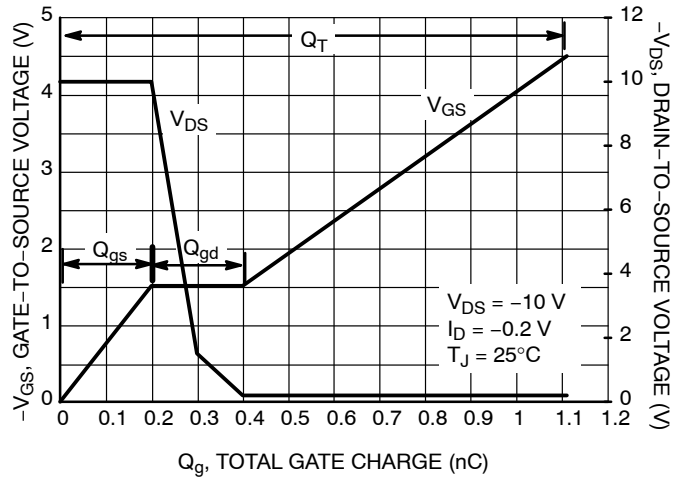


Figure 8. Gate-to-Source Voltage vs. Total Charge

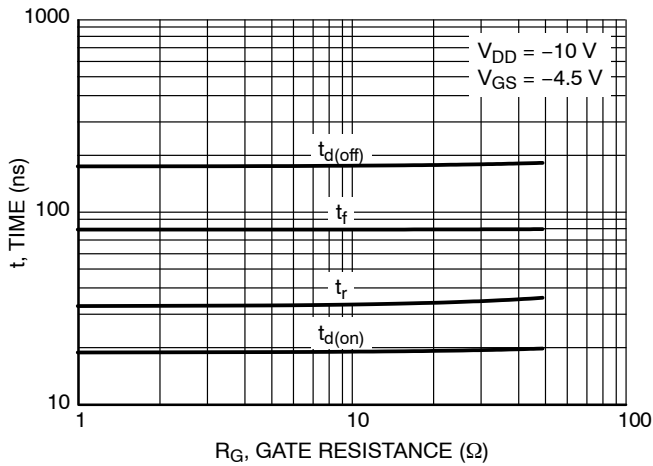


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

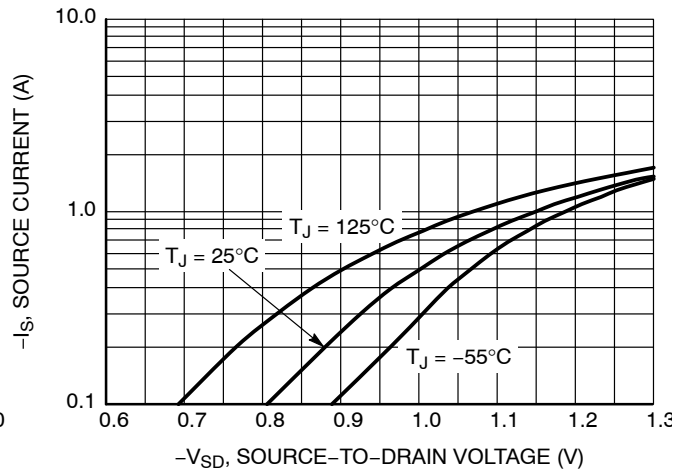


Figure 10. Diode Forward Voltage vs. Current

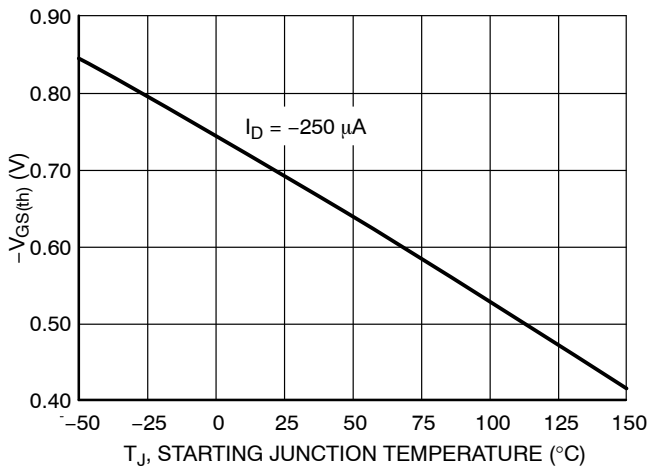


Figure 11. Threshold Voltage

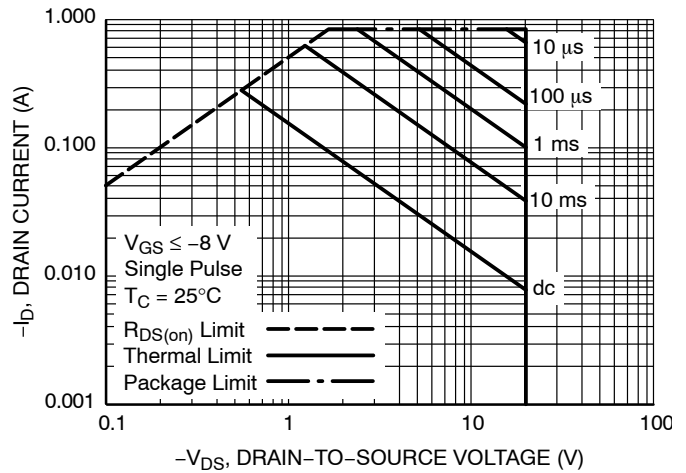


Figure 12. Maximum Rated Forward Biased Safe Operating Area

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## TYPICAL CHARACTERISTICS

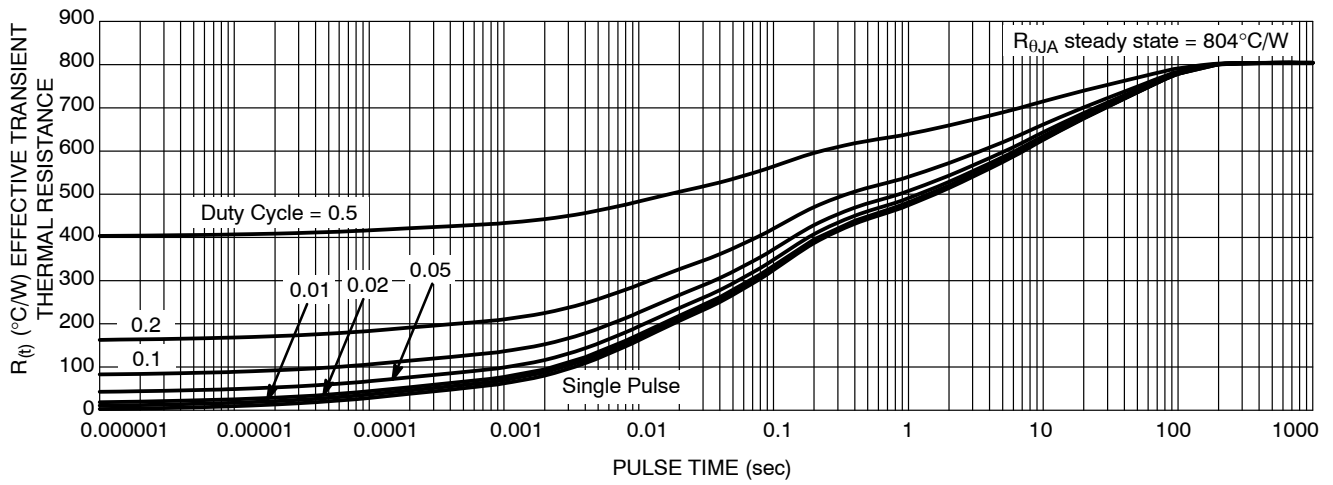


Figure 13. Thermal Response

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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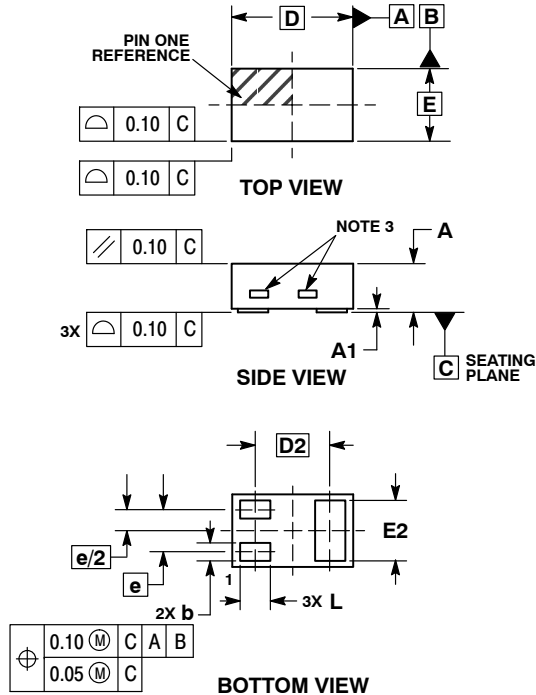


SOT-883 (XDFN3), 1.0x0.6, 0.35P  
CASE 506CB  
ISSUE A

DATE 30 MAR 2012



SCALE 8:1

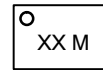


NOTES:

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 |

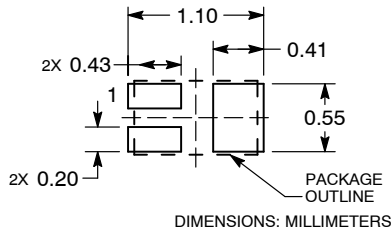
**GENERIC MARKING DIAGRAM\***



XX = Specific Device Code  
M = Date Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G", may or not be present.

**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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| <b>DESCRIPTION:</b>     | <b>SOT-883 (XDFN3), 1.0X0.6, 0.35P</b> | <b>PAGE 1 OF 1</b>   |

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