

# NTNS3C68NZ

## MOSFET – Single, N-Channel, Small Signal, SOT-883, (XDFN3), 1.0 x 0.6 x 0.4 mm 12 V, 758 mA

### 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 Ultra Small 1.0 x 0.6 mm Package
- 1.8 V Gate Drive
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- Load Switch
- High Speed Interfacing
- Level Shift and Translate
- Optimized for Power Management in Ultra Portable Solutions

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

| Parameter   |                     | Symbol                   | Value                    | Units            |    |
|---|---------------------|--------------------------|--------------------------|------------------|----|
| Drain-to-Source Voltage   |                     | $V_{DSS}$                | 12                       | V                |    |
| Gate-to-Source Voltage  |                     | $V_{GS}$                 | $\pm 8$                  | V                |    |
| Continuous Drain Current (Note 1)                                 | Steady State        | $I_D$                    | $T_A = 25^\circ\text{C}$ | 758              | mA |
|   |                     |                          | $T_A = 85^\circ\text{C}$ | 547              |    |
|   | $t \leq 5\text{ s}$ | $T_A = 25^\circ\text{C}$ | 898                      |                  |    |
| Power Dissipation (Note 1)  | Steady State        | $P_D$                    | $T_A = 25^\circ\text{C}$ | 156              | mW |
|   |                     |                          | $T_A = 25^\circ\text{C}$ | 219              |    |
|   | $t \leq 5\text{ s}$ | $T_A = 25^\circ\text{C}$ |                          |                  |    |
| Pulsed Drain Current  |                     | $I_{DM}$                 | 2.2                      | A                |    |
| Operating Junction and Storage Temperature                        |                     | $T_J, T_{STG}$           | -55 to 150               | $^\circ\text{C}$ |    |
| Source Current (Body Diode) (Note 2)                              |                     | $I_S$                    | 223                      | 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.

### THERMAL RESISTANCE RATINGS

| Parameter  | Symbol          | Max | Units                     |
|--|-----------------|-----|---------------------------|
| Junction-to-Ambient – Steady State (Note 1)        | $R_{\theta JA}$ | 800 | $^\circ\text{C}/\text{W}$ |
| Junction-to-Ambient – $t \leq 5\text{ s}$ (Note 1) | $R_{\theta JA}$ | 570 |                           |

1. Surface Mounted on FR4 Board using the minimum recommended pad size, (or 2 mm<sup>2</sup>), 1 oz Cu.



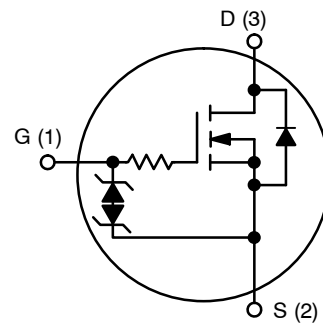
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### MOSFET

| $V_{(BR)DSS}$ | $R_{DS(on)}$ MAX       | $I_D$ MAX |
|---------------|------------------------|-----------|
| 12 V          | 0.160 $\Omega$ @ 4.5 V | 758 mA    |
|               | 0.175 $\Omega$ @ 3.7 V |           |
|               | 0.185 $\Omega$ @ 3.3 V |           |
|               | 0.230 $\Omega$ @ 2.5 V |           |
|               | 0.440 $\Omega$ @ 1.8 V |           |

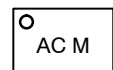
### N-Channel MOSFET



### MARKING DIAGRAM



SOT-883  
(XDFN3)  
CASE 506CB



AC = Specific Device Code  
M = Date Code

### ORDERING INFORMATION

| Device        | Package              | Shipping <sup>†</sup> |
|---------------|----------------------|-----------------------|
| NTNS3C68NZT5G | SOT-883<br>(Pb-Free) | 8000 /<br>Tape & Reel |

<sup>†</sup>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.

# NTNS3C68NZ

2. Pulse Test: pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

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

| Parameter   | Symbol            | Test Condition                                      | Min | Typ | Max      | Units                |
|---|-------------------|---|-----|-----|----------|----------------------|
| <b>OFF CHARACTERISTICS</b>                                |                   |   |     |     |          |                      |
| Drain-to-Source Breakdown Voltage                         | $V_{(BR)DSS}$     | $V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$       | 12  |     |          | V                    |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | $I_D = 250 \mu\text{A}$ , ref to $25^\circ\text{C}$ |     | 11  |          | mV/ $^\circ\text{C}$ |
| Zero Gate Voltage Drain Current                           | $I_{DSS}$         | $V_{GS} = 0 \text{ V}, V_{DS} = 9.6 \text{ V}$      |     |     | 1.0      | $\mu\text{A}$        |
| Gate-to-Source Leakage Current                            | $I_{GSS}$         | $V_{DS} = 0 \text{ V}, V_{GS} = \pm 10 \text{ V}$   |     |     | $\pm 10$ | $\mu\text{A}$        |

## ON CHARACTERISTICS (Note 3)

|   |                  |  |     |       |       |                      |
|---|------------------|--|-----|-------|-------|----------------------|
| Gate Threshold Voltage                          | $V_{GS(TH)}$     | $V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$       | 0.4 |       | 1.0   | V                    |
| Negative Gate Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ |  |     | 1.1   |       | mV/ $^\circ\text{C}$ |
| Drain-to-Source On Resistance                   | $R_{DS(on)}$     | $V_{GS} = 4.5 \text{ V}, I_D = 100 \text{ mA}$ |     | 0.120 | 0.160 | $\Omega$             |
|   |                  | $V_{GS} = 3.7 \text{ V}, I_D = 75 \text{ mA}$  |     | 0.130 | 0.175 |                      |
|   |                  | $V_{GS} = 3.3 \text{ V}, I_D = 75 \text{ mA}$  |     | 0.135 | 0.185 |                      |
|   |                  | $V_{GS} = 2.5 \text{ V}, I_D = 50 \text{ mA}$  |     | 0.167 | 0.230 |                      |
|   |                  | $V_{GS} = 1.8 \text{ V}, I_D = 20 \text{ mA}$  |     | 0.250 | 0.440 |                      |
|   |                  | $V_{GS} = 1.5 \text{ V}, I_D = 10 \text{ mA}$  |     | 0.44  |       |                      |
| Forward Transconductance                        | $g_{FS}$         | $V_{DS} = 5 \text{ V}, I_D = 100 \text{ mA}$   |     | 0.8   |       | S                    |
| Source-Drain Diode Voltage                      | $V_{SD}$         | $V_{GS} = 0 \text{ V}, I_S = 100 \text{ mA}$   |     | 0.68  | 1.1   | V                    |

## CHARGES & CAPACITANCES

|                              |              |  |  |     |  |    |
|------------------------------|--------------|--|--|-----|--|----|
| Input Capacitance            | $C_{ISS}$    | $V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}, V_{DS} = 9.6 \text{ V}$      |  | 67  |  | pF |
| Output Capacitance           | $C_{OSS}$    |  |  | 19  |  |    |
| Reverse Transfer Capacitance | $C_{RSS}$    |  |  | 8.5 |  |    |
| Total Gate Charge            | $Q_{G(TOT)}$ | $V_{GS} = 4.5 \text{ V}, V_{DS} = 9.6 \text{ V}, I_D = 100 \text{ mA}$ |  | 1.8 |  | nC |
| Threshold Gate Charge        | $Q_{G(TH)}$  |  |  | 0.1 |  |    |
| Gate-to-Source Charge        | $Q_{GS}$     |  |  | 0.3 |  |    |
| Gate-to-Drain Charge         | $Q_{GD}$     |  |  | 0.4 |  |    |

## SWITCHING CHARACTERISTICS, $V_{GS} = 4.5 \text{ V}$ (Note 3)

|                     |              |  |  |      |  |    |
|---------------------|--------------|--|--|------|--|----|
| Turn-On Delay Time  | $t_{d(ON)}$  | $V_{GS} = 4.5 \text{ V}, V_{DD} = 9.6 \text{ V}, I_D = 100 \text{ mA}, R_G = 2 \Omega$ |  | 10.7 |  | ns |
| Rise Time           | $t_r$        |  |  | 19.4 |  |    |
| Turn-Off Delay Time | $t_{d(OFF)}$ |  |  | 710  |  |    |
| Fall Time           | $t_f$        |  |  | 310  |  |    |

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.

3. Switching characteristics are independent of operating junction temperatures.

# NTNS3C68NZ

## TYPICAL CHARACTERISTICS

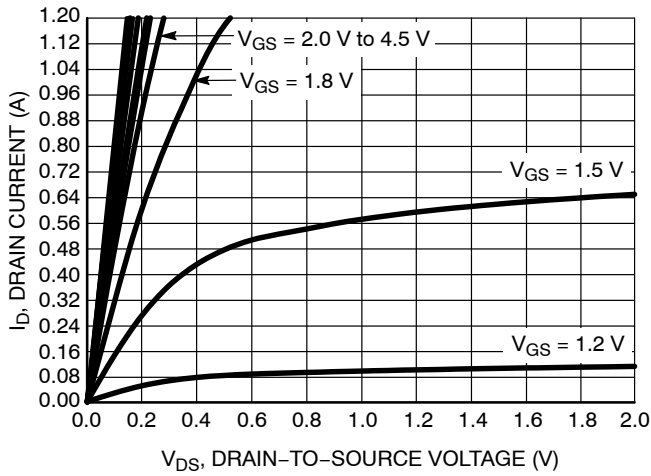


Figure 1. On-Region Characteristics

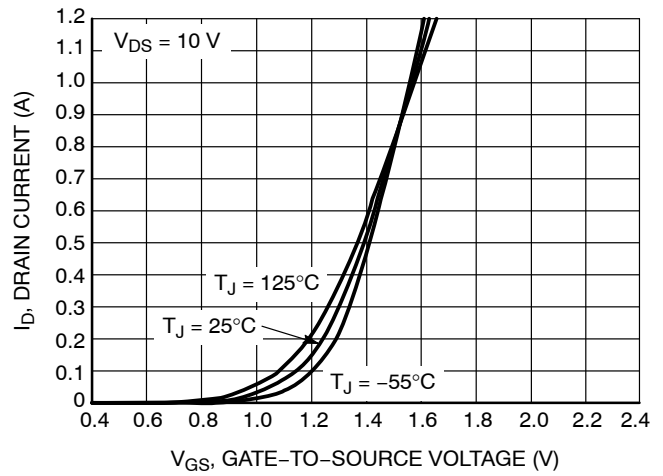


Figure 2. Transfer Characteristics

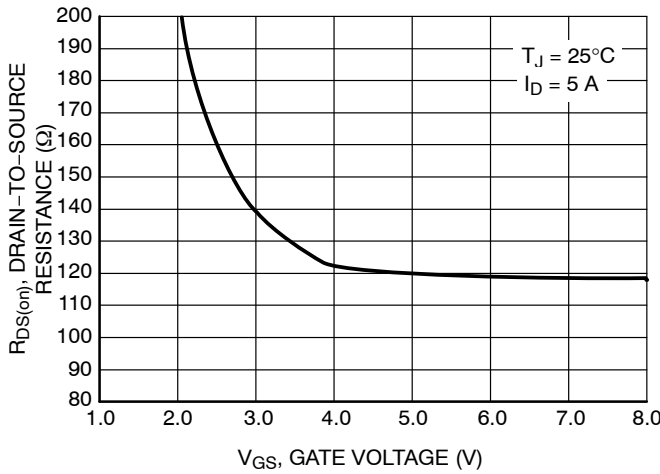


Figure 3. On-Resistance vs. Gate-to-Source Voltage

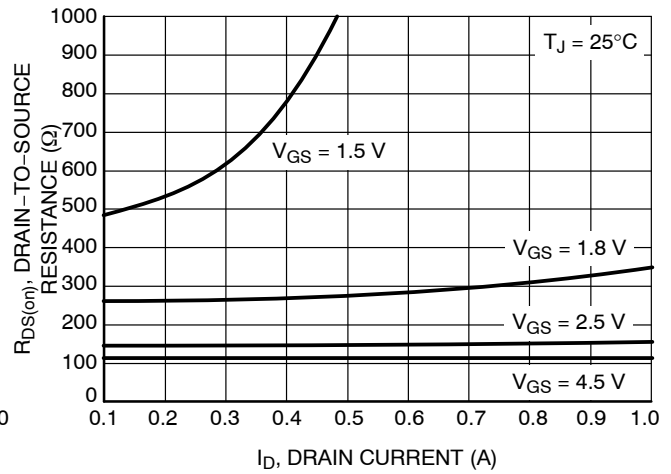


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

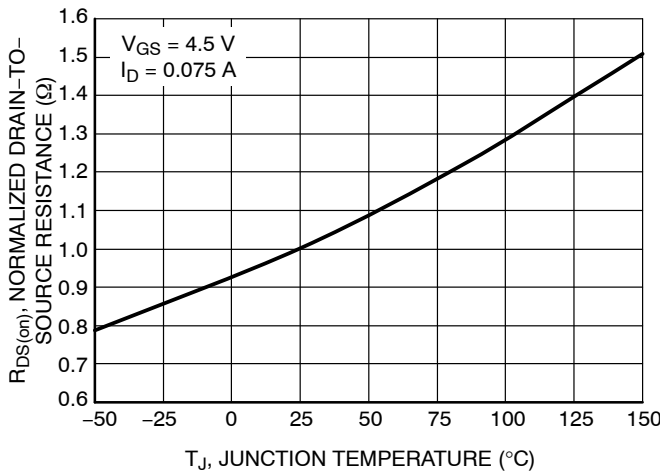


Figure 5. On-Resistance Variation with Temperature

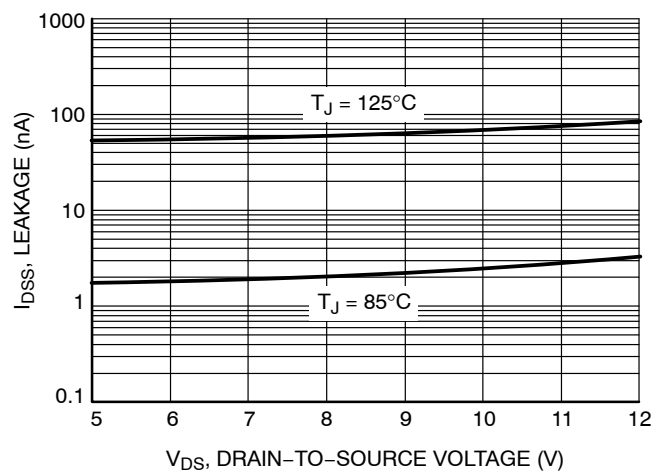
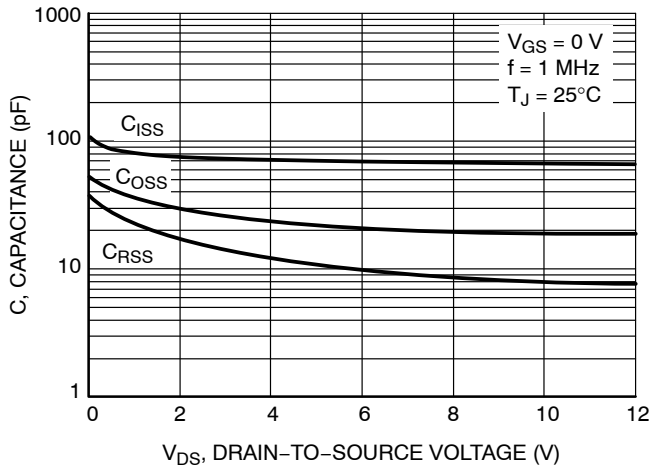


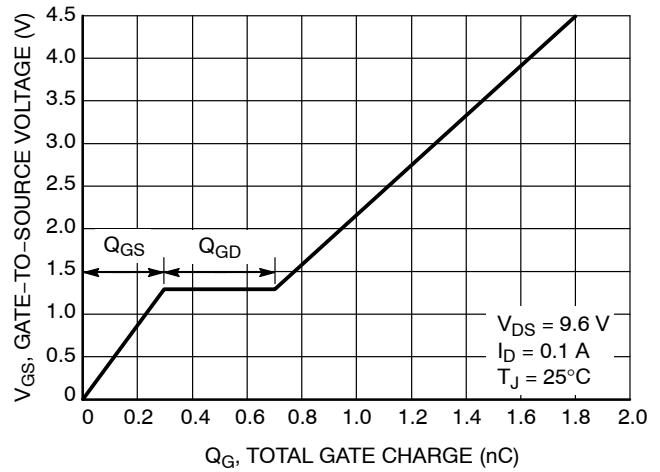
Figure 6. Drain-to-Source Leakage Current vs. Voltage

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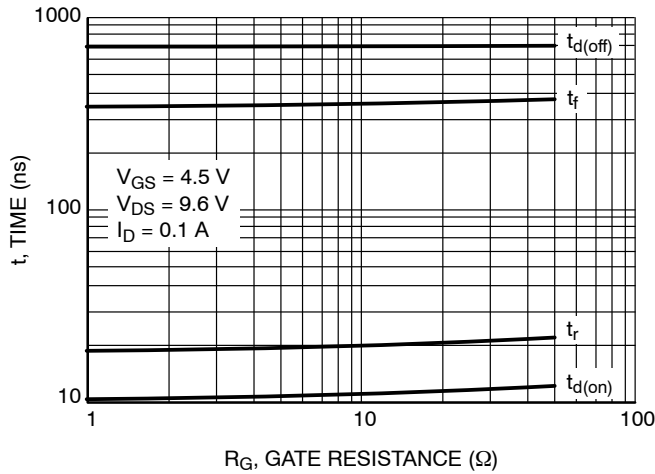
## TYPICAL CHARACTERISTICS



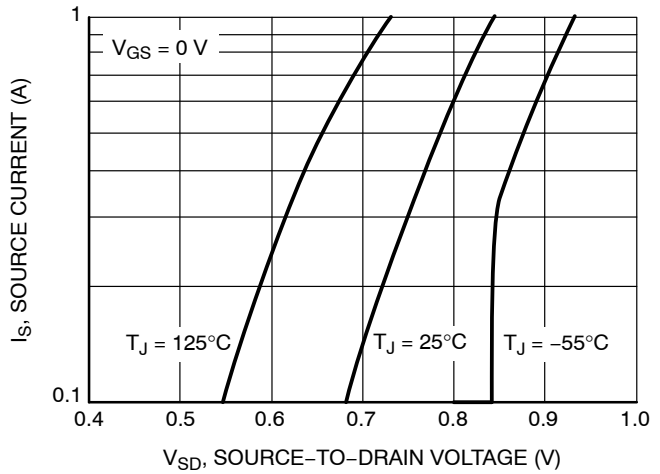
**Figure 7. Capacitance Variation**



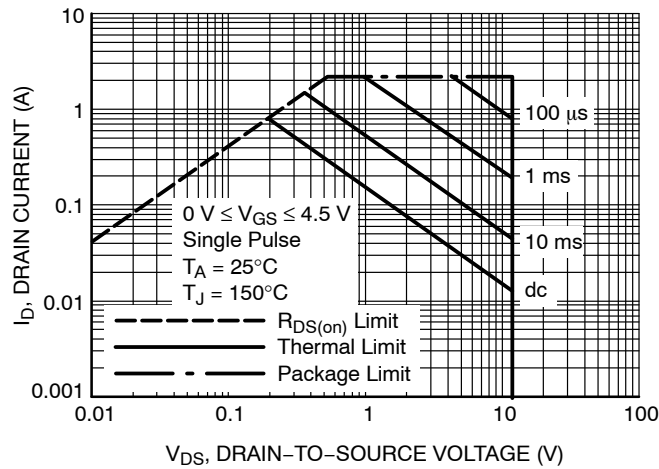
**Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge**



**Figure 9. Resistive Switching Time Variation vs. Gate Resistance**



**Figure 10. Diode Forward Voltage vs. Current**



**Figure 11. Maximum Rated Forward Biased Safe Operating Area**

# NTNS3C68NZ

## TYPICAL CHARACTERISTICS

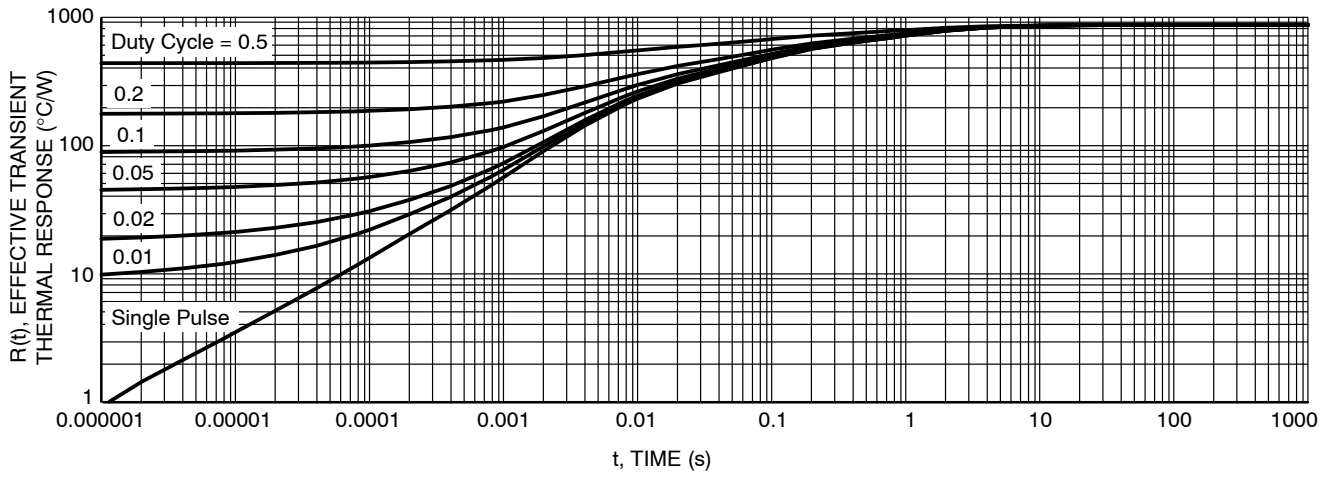


Figure 12. FET Thermal Response

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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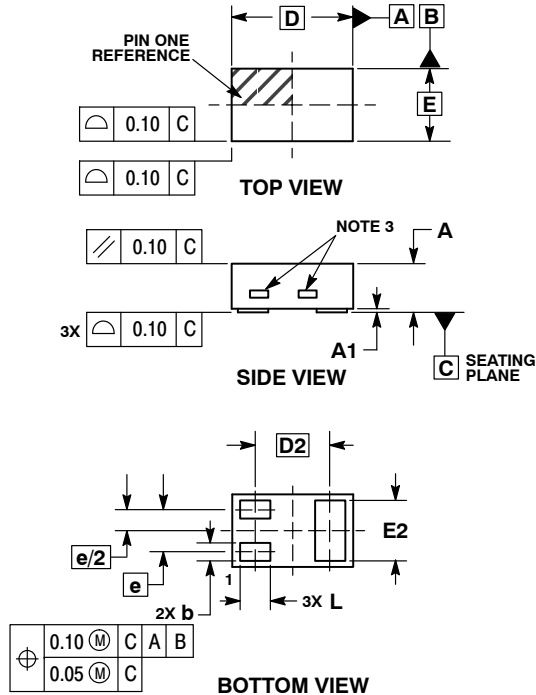


SOT-883 (XDFN3), 1.0x0.6, 0.35P  
CASE 506CB  
ISSUE A

DATE 30 MAR 2012



SCALE 8:1

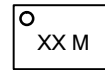


NOTES:

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 |

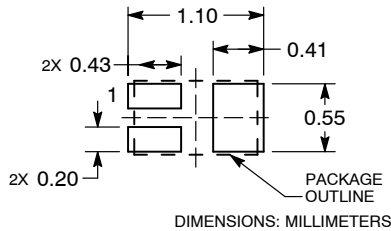
**GENERIC MARKING DIAGRAM\***



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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