

NTNS3193NZ

MOSFET – Single N-Channel, Small Signal, XLLGA3, 0.62 x 0.62 x 0.4 20 V, 224 mA



ON Semiconductor®

<http://onsemi.com>

Features

- Single N-Channel MOSFET
- Ultra Small and Thin Package (0.62 x 0.62 x 0.4 mm)
- Low $R_{DS(on)}$ Solution in 0.62 x 0.62 mm Package
- 1.5 V Gate Voltage Rating
- 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 stated)

| Parameter | | Symbol | Value | Units | |
|---|--------------|--------------------------|--------------------------|------------------|------------------|
| Drain-to-Source Voltage | | V_{DSS} | 20 | V | |
| Gate-to-Source Voltage | | V_{GS} | ± 8.0 | V | |
| Continuous Drain Current (Note 1) | Steady State | I_D | $T_A = 25^\circ\text{C}$ | 224 | mA |
| | | | $T_A = 85^\circ\text{C}$ | 162 | |
| | $t \leq 5$ s | $T_A = 25^\circ\text{C}$ | 241 | | |
| Power Dissipation (Note 1) | Steady State | P_D | $T_A = 25^\circ\text{C}$ | 120 | mW |
| | | | $T_A = 25^\circ\text{C}$ | 139 | |
| Pulsed Drain Current | | $t_p = 10 \mu\text{s}$ | I_{DM} | 673 | mA |
| Operating Junction and Storage Temperature | | T_J, T_{STG} | -55 to 150 | | $^\circ\text{C}$ |
| Source Current (Body Diode) | | I_S | 120 | 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.

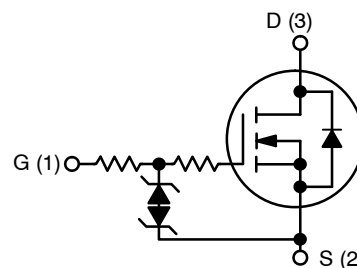
THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Max | Units |
|---|-----------------|------|---------------------------|
| Junction-to-Ambient – Steady State (Note 1) | $R_{\theta JA}$ | 1040 | $^\circ\text{C}/\text{W}$ |
| Junction-to-Ambient – $t \leq 5$ s (Note 1) | $R_{\theta JA}$ | 900 | |

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 $\leq 2\%$.

| MOSFET | | |
|---------------|----------------------|-----------|
| $V_{(BR)DSS}$ | $R_{DS(on)}$ MAX | I_D MAX |
| 20 V | 1.4 Ω @ 4.5 V | 224 mA |
| | 1.9 Ω @ 2.5 V | |
| | 2.2 Ω @ 1.8 V | |
| | 4.3 Ω @ 1.5 V | |

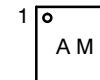
N-Channel MOSFET



MARKING DIAGRAM



XLLGA3
CASE 713AB



A = Specific Device Code
M = Date Code

ORDERING INFORMATION

| Device | Package | Shipping† |
|---------------|------------------|--------------------|
| NTNS3193Nzt5G | XLLGA3 (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.

NTNS3193NZ

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

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

OFF CHARACTERISTICS

| | | | | | | |
|---|--------------------------------------|--|----|----|------|-------|
| Drain-to-Source Breakdown Voltage | V _{(BR)DSS} | V _{GS} = 0 V, I _D = 250 μA | 20 | | | V |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | V _{(BR)DSS} /T _J | I _D = -250 μA, ref to 25°C | | 19 | | mV/°C |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{GS} = 0 V, V _{DS} = 20 V | | | 1.0 | μA |
| Gate-to-Source Leakage Current | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±8.0 V | | | ±2.0 | μA |

ON CHARACTERISTICS (Note 3)

| | | | | | | |
|---|-------------------------------------|---|-----|------|-----|-------|
| Gate Threshold Voltage | V _{GS(TH)} | V _{GS} = V _{DS} , I _D = 250 μA | 0.4 | | 1.0 | V |
| Negative Gate Threshold Temperature Coefficient | V _{GS(TH)} /T _J | | | 1.9 | | mV/°C |
| Drain-to-Source On Resistance | R _{DS(on)} | V _{GS} = 4.5 V, I _D = 100 mA | | 0.65 | 1.4 | Ω |
| | | V _{GS} = 2.5 V, I _D = 50 mA | | 0.9 | 1.9 | |
| | | V _{GS} = 1.8 V, I _D = 20 mA | | 1.1 | 2.2 | |
| | | V _{GS} = 1.5 V, I _D = 10 mA | | 1.4 | 4.3 | |
| Forward Transconductance | g _{FS} | V _{DS} = 5 V, I _D = 100 mA | | 0.56 | | S |
| Source-Drain Diode Voltage | V _{SD} | V _{GS} = 0 V, I _S = 10 mA | | 0.55 | 1.0 | V |

CHARGES & CAPACITANCES

| | | | | | | |
|------------------------------|---------------------|---|--|------|--|----|
| Input Capacitance | C _{ISS} | V _{GS} = 0 V, f = 1 MHz, V _{DS} = 15 V | | 15.8 | | pF |
| Output Capacitance | C _{OSS} | | | 3.5 | | |
| Reverse Transfer Capacitance | C _{RSS} | | | 2.4 | | |
| Total Gate Charge | Q _{G(TOT)} | V _{GS} = 4.5 V, V _{DS} = 15 V, I _D = 200 mA | | 0.70 | | nC |
| Threshold Gate Charge | Q _{G(TH)} | | | 0.05 | | |
| Gate-to-Source Charge | Q _{GS} | | | 0.14 | | |
| Gate-to-Drain Charge | Q _{GD} | | | 0.10 | | |

SWITCHING CHARACTERISTICS, V_{GS} = 4.5 V (Note 3)

| | | | | | | |
|---------------------|---------------------|---|--|-----|--|----|
| Turn-On Delay Time | t _{d(ON)} | V _{GS} = 4.5 V, V _{DD} = 15 V, I _D = 200 mA, R _G = 2 Ω | | 18 | | ns |
| Rise Time | t _r | | | 35 | | |
| Turn-Off Delay Time | t _{d(OFF)} | | | 201 | | |
| Fall Time | t _f | | | 110 | | |

3. Switching characteristics are independent of operating junction temperatures.

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TYPICAL CHARACTERISTICS

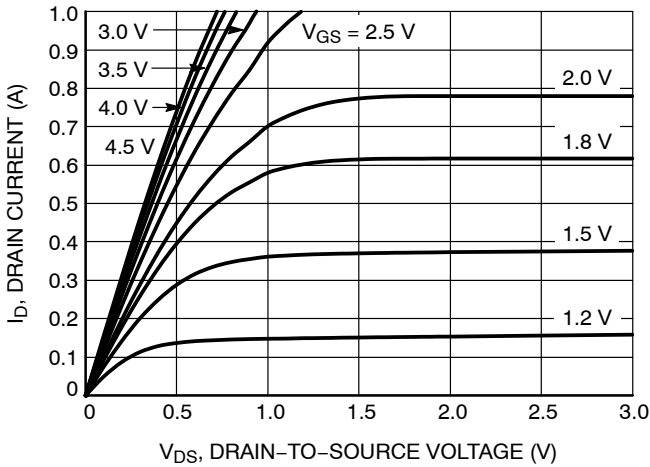


Figure 1. On-Region Characteristics

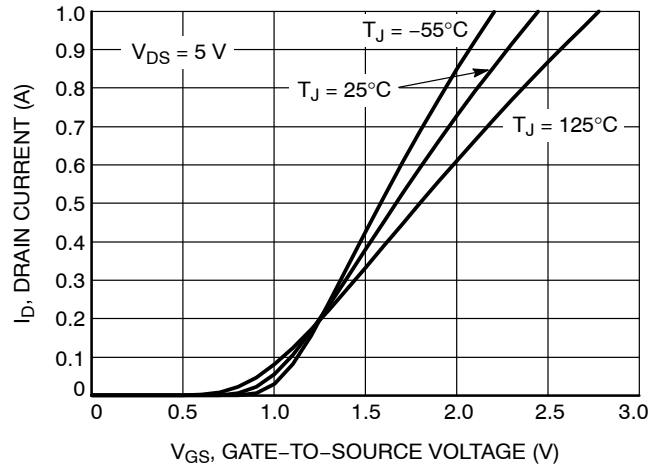


Figure 2. Transfer Characteristics

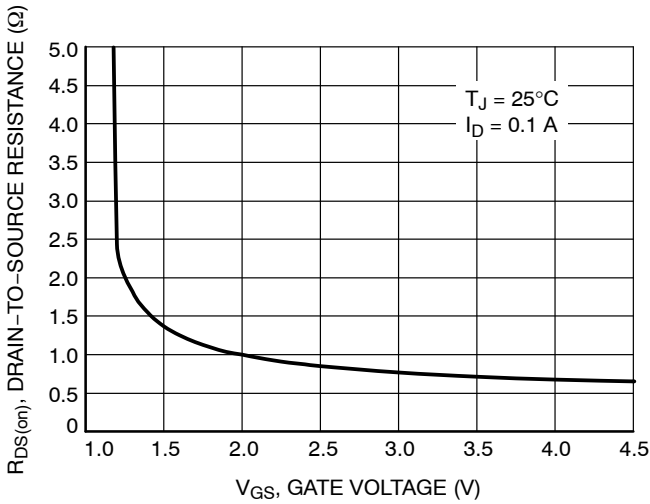


Figure 3. On-Resistance vs. Gate-to-Source Voltage

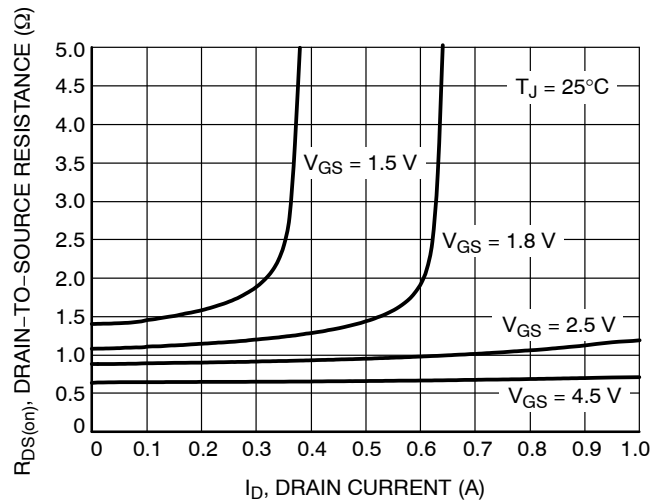


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

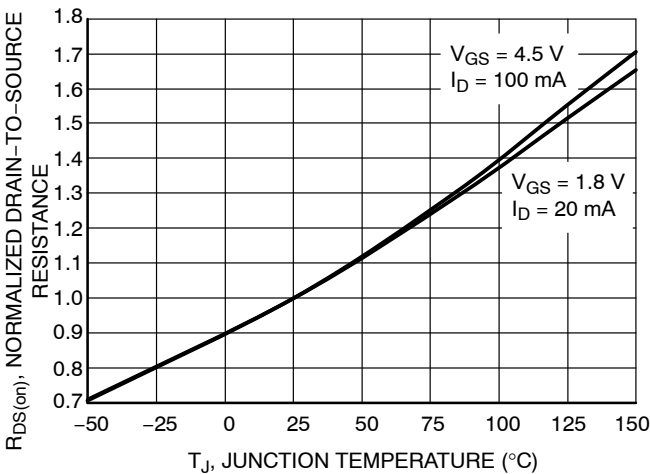


Figure 5. On-Resistance Variation with Temperature

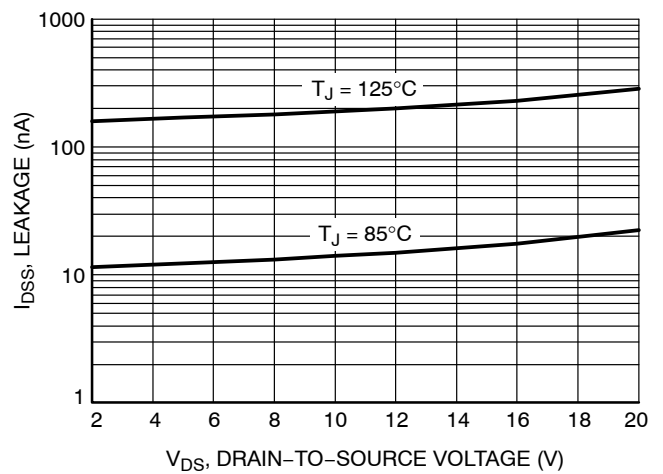


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL CHARACTERISTICS

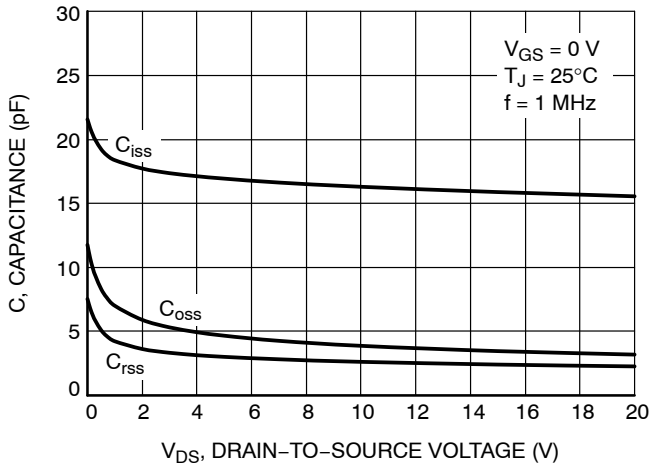


Figure 7. Capacitance Variation

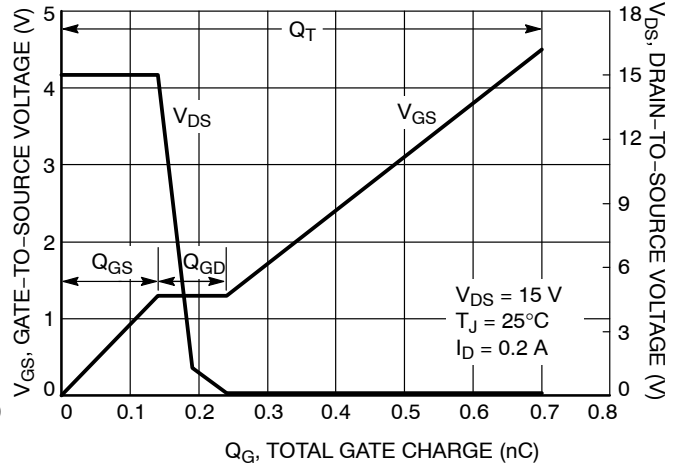


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

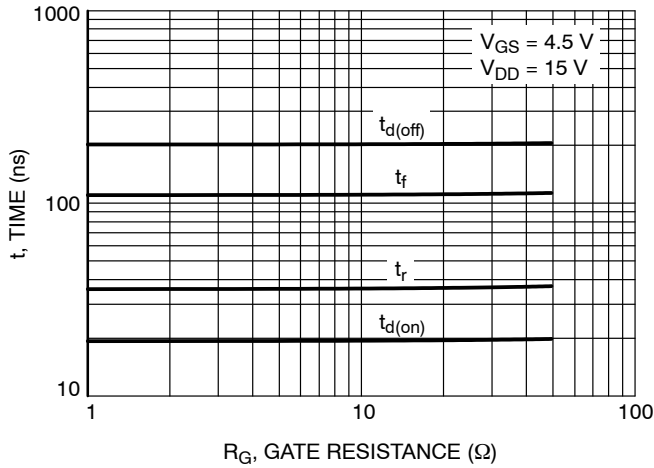


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

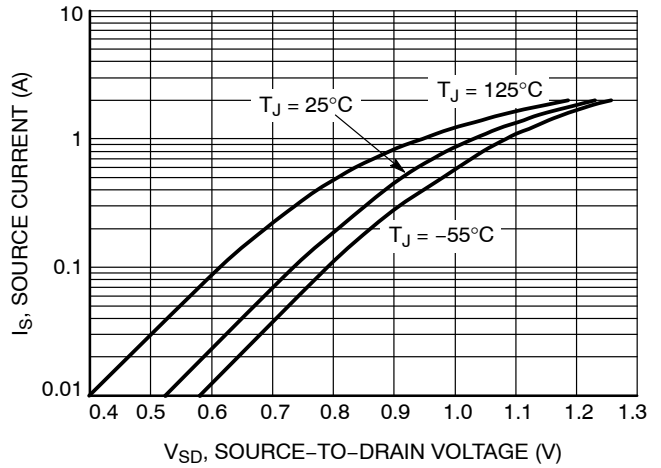


Figure 10. Diode Forward Voltage vs. Current

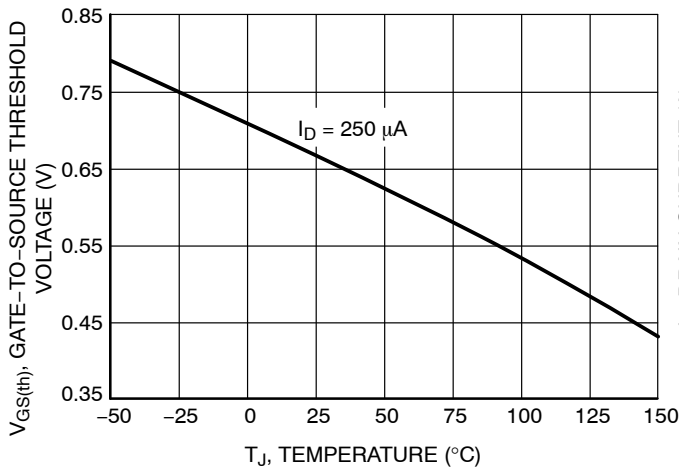


Figure 11. Threshold Voltage

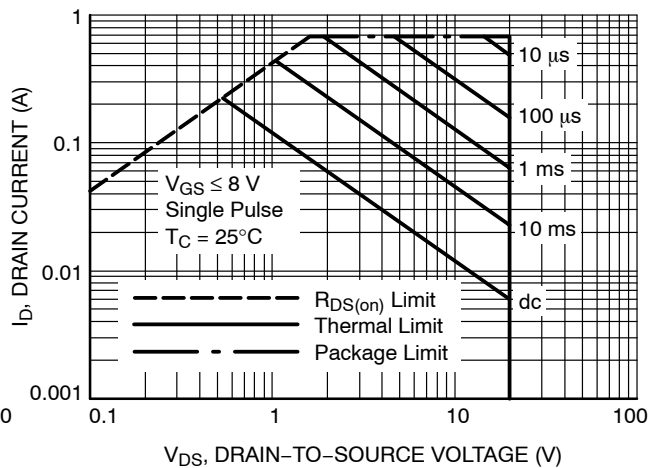


Figure 12. Maximum Rated Forward Biased Safe Operating Area

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TYPICAL CHARACTERISTICS

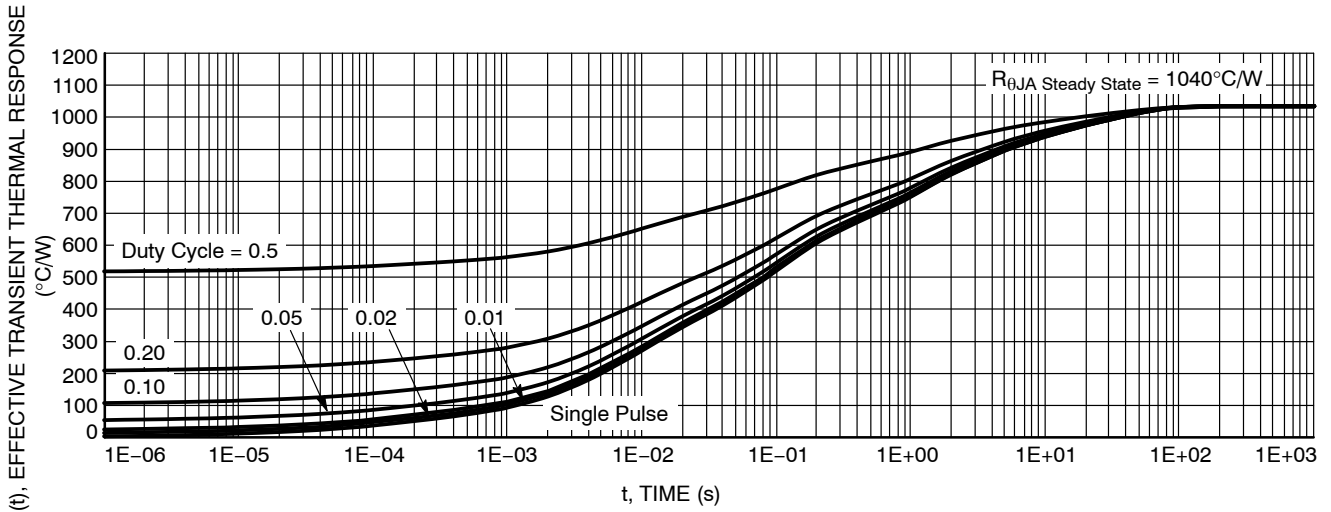
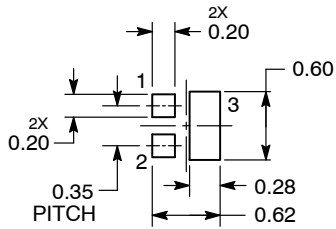


Figure 13. FET Thermal Response

MINIMUM RECOMMENDED SOLDER FOOTPRINT*



DIMENSIONS: MILLIMETERS

*Dependent upon end user capabilities, this footprint could be used as a minimum.

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

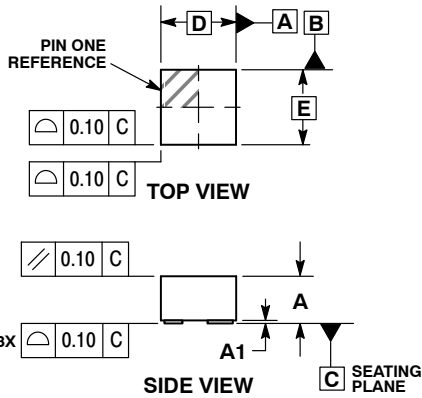
ON Semiconductor®



SCALE 8:1

XLLGA3, 0.62x0.62, 0.35P
CASE 713AB
ISSUE O

DATE 25 SEP 2012



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.

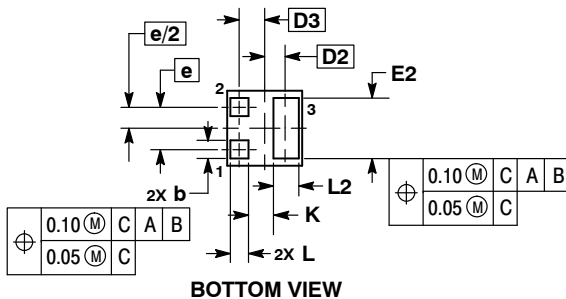
| MILLIMETERS | | |
|-------------|-----------|-------|
| DIM | MIN | MAX |
| A | 0.340 | 0.440 |
| A1 | 0.000 | 0.030 |
| b | 0.100 | 0.200 |
| D | 0.620 BSC | |
| D2 | 0.175 BSC | |
| D3 | 0.205 BSC | |
| E | 0.620 BSC | |
| E2 | 0.400 | 0.600 |
| e | 0.350 BSC | |
| K | 0.200 REF | |
| L | 0.090 | 0.210 |
| L2 | 0.110 | 0.310 |

GENERIC MARKING DIAGRAM*

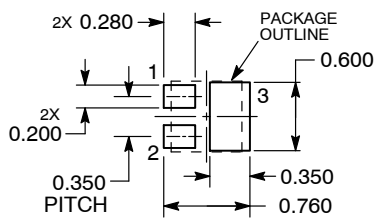


- X = Specific Device Code
- M = Date Code

*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*



DIMENSIONS: MILLIMETERS

*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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