

MOSFET - Power, Single N-Channel, SO8-FL 30 V, 0.9 mΩ, 298 A



ON Semiconductor®

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NTMFS0D9N03CG

Features

- Advanced Package (5x6mm) with Excellent Thermal Conduction
- Ultra Low $R_{DS(on)}$ to Improve System Efficiency
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Hot Swap Application
- Power Load Switch
- Battery Management and Protection

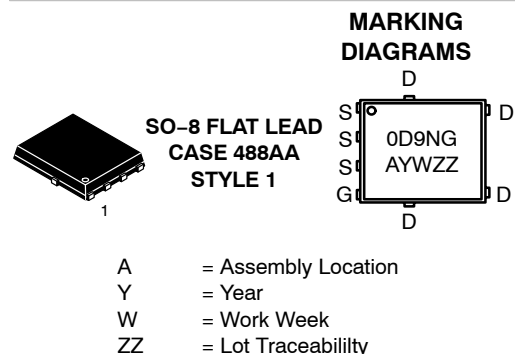
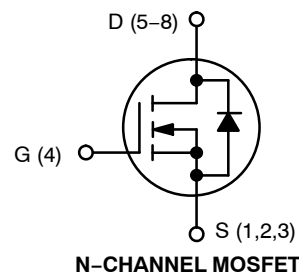
MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

| Parameter | Symbol | Value | Unit | |
|---|--|---------------------------|-------------|------------------|
| Drain-to-Source Voltage | V_{DSS} | 30 | V | |
| Gate-to-Source Voltage | V_{GS} | ± 20 | V | |
| Continuous Drain Current $R_{\theta JC}$ (Note 2) | Steady State | $T_C = 25^\circ\text{C}$ | 298 | A |
| | | $T_C = 100^\circ\text{C}$ | 211 | |
| Power Dissipation $R_{\theta JC}$ (Note 2) | | $T_C = 25^\circ\text{C}$ | 144 | W |
| Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2) | Steady State | $T_A = 25^\circ\text{C}$ | 48 | A |
| | | $T_A = 100^\circ\text{C}$ | 34 | |
| Power Dissipation $R_{\theta JA}$ (Notes 1, 2) | | $T_A = 25^\circ\text{C}$ | 3.8 | W |
| Pulsed Drain Current | $T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$ | I_{DM} | 900 | A |
| Source Current (Body Diode) | | I_S | 120 | A |
| Single Pulse Drain-to-Source Avalanche Energy ($I_L = 29.2 \text{ A}_{pk}$) | | E_{AS} | 556 | mJ |
| Operating Junction and Storage Temperature | | T_J, T_{STG} | -55 to +175 | $^\circ\text{C}$ |
| 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 1 in² pad, 2 oz Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ MAX}$ | $I_D \text{ MAX}$ |
|---------------|--------------------------|-------------------|
| 30 V | 0.9 mΩ @ 10 V | 298 A |



ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

NTMFS0D9N03CG

THERMAL RESISTANCE MAXIMUM RATINGS

| Parameter | Symbol | Value | Unit |
|---|-----------------|-------|------|
| Junction-to-Case – Steady State | $R_{\theta JC}$ | 1.0 | °C/W |
| Junction-to-Ambient – Steady State (Note 3) | $R_{\theta JA}$ | 39 | |

3. Surface-mounted on FR4 board using 1 in² pad, 2 oz Cu pad.

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 | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$ | 30 | | | V |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | $I_D = 250\ \mu\text{A}$, ref to 25°C | | 13 | | mV/°C |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{GS} = 0\text{ V}, V_{DS} = 30\text{ V}$ | $T_J = 25^\circ\text{C}$ | | 1.0 | μA |
| | | | $T_J = 125^\circ\text{C}$ | | 100 | |
| Gate-to-Source Leakage Current | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = 20\text{ V}$ | | | 100 | nA |

ON CHARACTERISTICS (Note 4)

| | | | | | | |
|-----------------------------------|------------------|--|-----|------|-----|------------|
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = 200\ \mu\text{A}$ | 1.3 | | 2.2 | V |
| Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ | $I_D = 200\ \mu\text{A}$, ref to 25°C | | -5 | | mV/°C |
| Drain-to-Source On Resistance | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}$ | | 0.71 | 0.9 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS} = 3\text{ V}, I_D = 20\text{ A}$ | | 70 | | S |
| Gate Resistance | R_G | $T_A = 25^\circ\text{C}$ | | 1.5 | | Ω |

CHARGES AND CAPACITANCES

| | | | | | | |
|------------------------------|--------------|---|--|-------|--|----|
| Input Capacitance | C_{ISS} | $V_{GS} = 0\text{ V}, V_{DS} = 15\text{ V}, f = 1\text{ MHz}$ | | 9550 | | pF |
| Output Capacitance | C_{OSS} | | | 4306 | | |
| Reverse Transfer Capacitance | C_{RSS} | | | 243 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS} = 10\text{ V}, V_{DS} = 15\text{ V}; I_D = 20\text{ A}$ | | 131.4 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | 14.2 | | |
| Gate-to-Source Charge | Q_{GS} | | | 24.2 | | |
| Gate-to-Drain Charge | Q_{GD} | | | 13.5 | | |

SWITCHING CHARACTERISTICS (Note 5)

| | | | | | | |
|---------------------|--------------|--|--|----|--|----|
| Turn-On Delay Time | $t_{d(ON)}$ | $V_{GS} = 10\text{ V}, V_{DS} = 15\text{ V}, I_D = 20\text{ A}, R_G = 3.0\ \Omega$ | | 20 | | ns |
| Rise Time | t_r | | | 16 | | |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | | 93 | | |
| Fall Time | t_f | | | 24 | | |

DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | | |
|-------------------------|----------|--|---------------------------|--|------|-----|----|
| Forward Diode Voltage | V_{SD} | $V_{GS} = 0\text{ V}, I_S = 10\text{ A}$ | $T_J = 25^\circ\text{C}$ | | 0.75 | 1.2 | V |
| | | | $T_J = 125^\circ\text{C}$ | | 0.60 | | |
| Reverse Recovery Time | t_{RR} | $V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s}, V_{DS} = 15\text{ V}, I_S = 20\text{ A}$ | | | 83 | | ns |
| Reverse Recovery Charge | Q_{RR} | | | | 114 | | nC |

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

5. Switching characteristics are independent of operating junction temperatures.

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TYPICAL CHARACTERISTICS

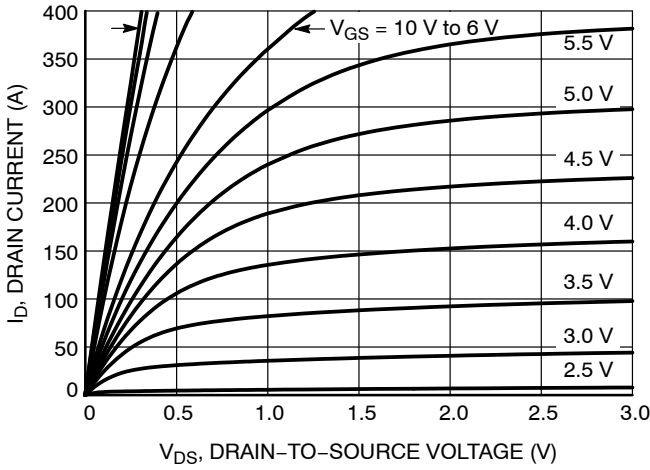


Figure 1. On-Region Characteristics

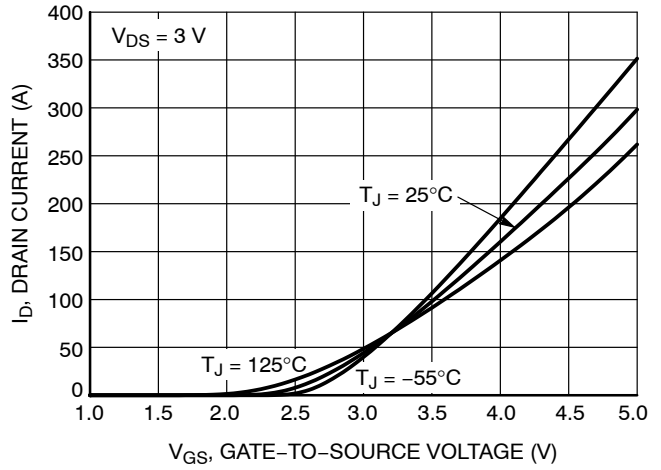


Figure 2. Transfer Characteristics

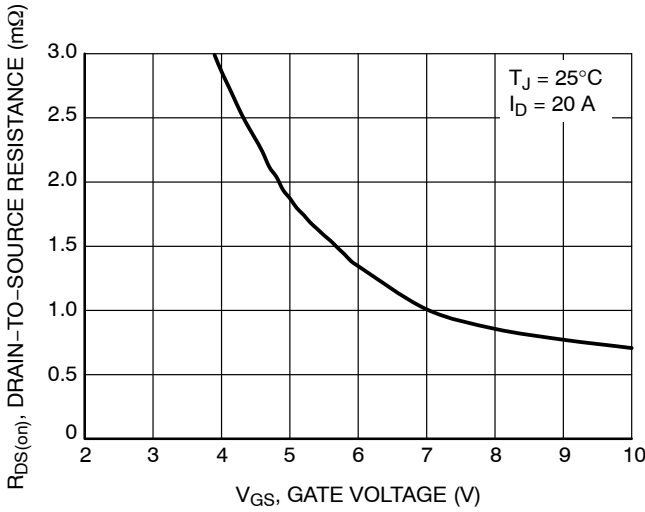


Figure 3. On-Resistance vs. Gate-to-Source Voltage

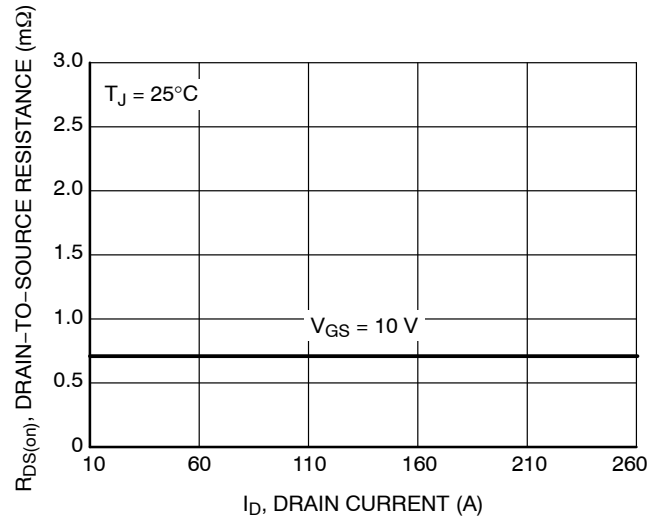


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

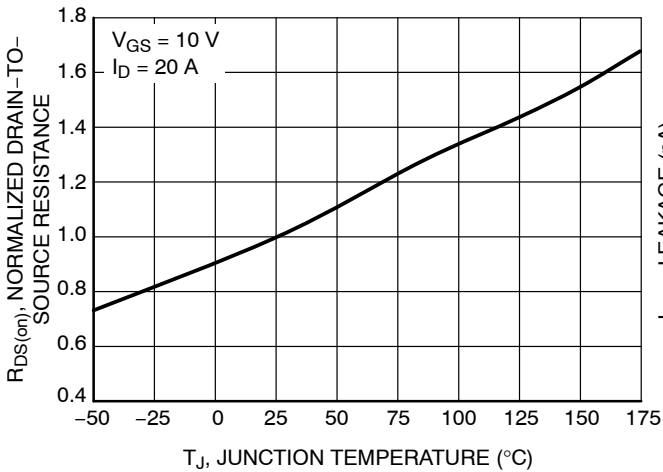


Figure 5. On-Resistance Variation with Temperature

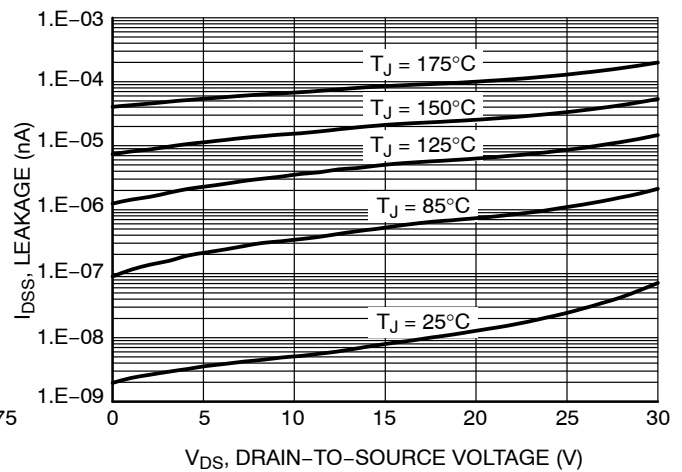


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL CHARACTERISTICS

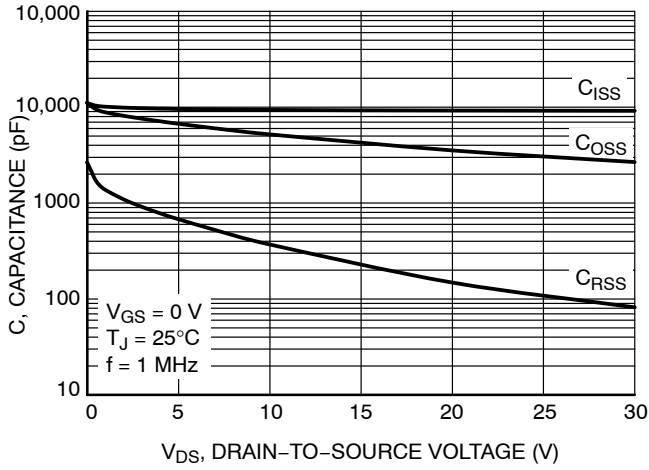


Figure 7. Capacitance Variation

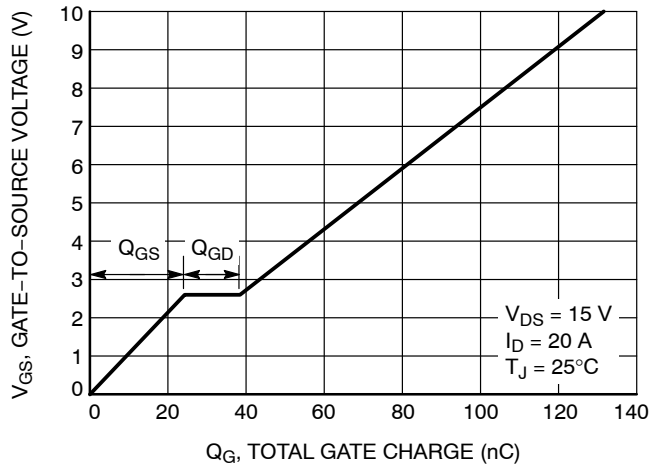


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

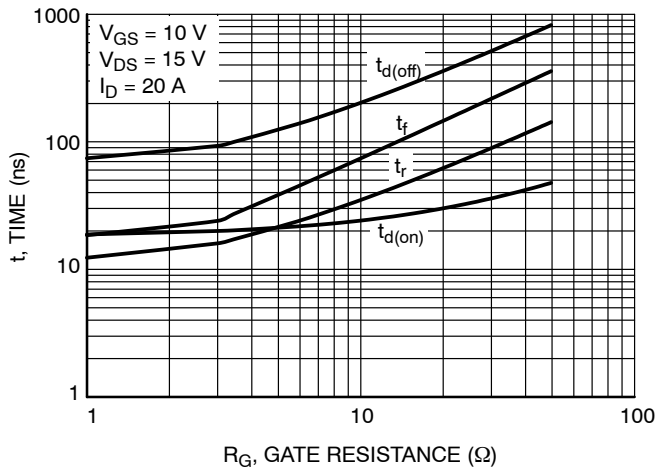


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

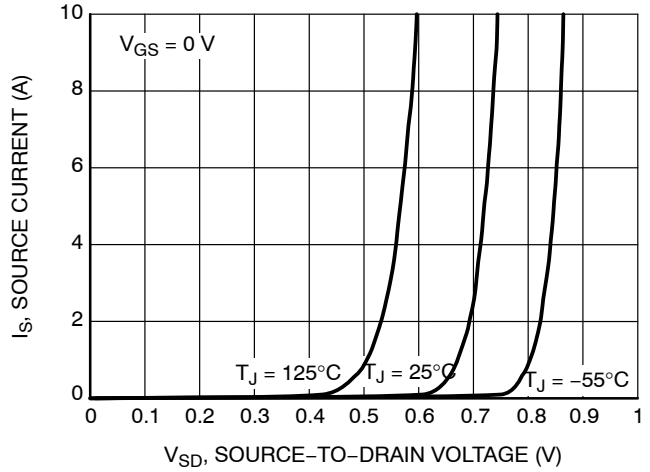


Figure 10. Diode Forward Voltage vs. Current

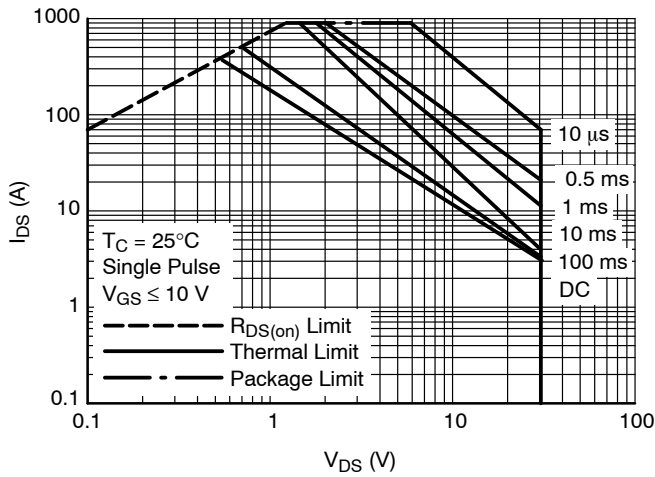


Figure 11. Safe Operating Area

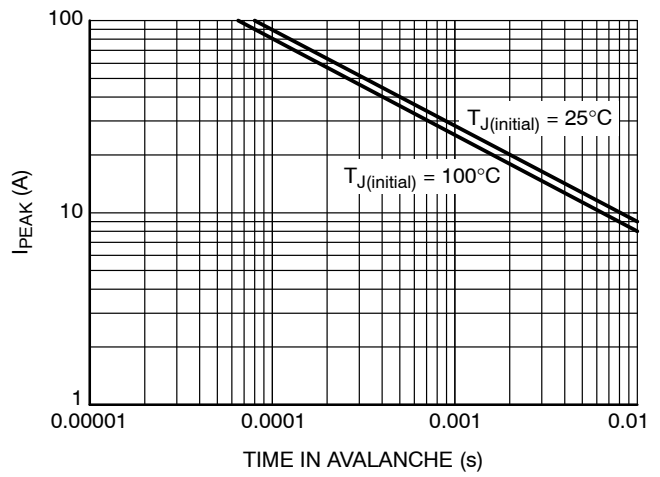


Figure 12. I_{PEAK} vs. Time in Avalanche

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TYPICAL CHARACTERISTICS

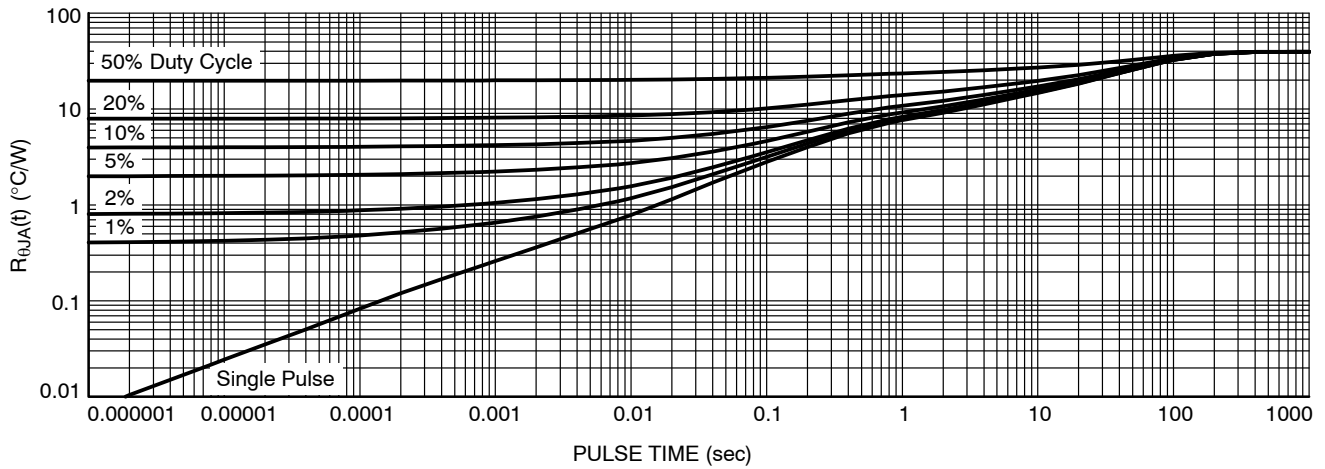


Figure 13. Thermal Characteristics

DEVICE ORDERING INFORMATION

| Device | Marking | Package | Shipping† |
|------------------|---------|-------------------|--------------------|
| NTMFS0D9N03CGT1G | 0D9NG | DFN5 (Pb-Free) | 1500 / 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.

