# STN3NF06L-VB Datasheet

# N-Channel 60-V (D-S) MOSFET

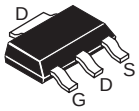
| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DS}$ (V) | $R_{DS(on)}$ (Ω) | $I_D$ (A) |
| 60 | 0.028 at $V_{GS}$ = 10 V | 7.0 |
| | 0.033 at $V_{GS}$ = 4.5 V | 5.6 |

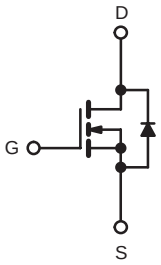
## FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- Trench Power MOSFETs
- 175 °C Maximum Junction Temperature
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

**SOT-223**




N-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS $T_A$ = 25 °C, unless otherwise noted | | | | | |
|---|---|---|---|---|---|
| **Parameter** | | **Symbol** | **10 s** | **Steady State** | **Unit** |
| Drain-Source Voltage | | $V_{DS}$ | 60 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ± 20 | | |
| Continuous Drain Current ($T_J$ = 175 °C)[a] | $T_A$ = 25 °C | $I_D$ | 7.0 | 6.0 | A |
| | $T_A$ = 70 °C | | 6.1 | 5.0 | |
| Pulsed Drain Current | | $I_{DM}$ | 40 | | |
| Avalanche Current | | $I_{AS}$ | 15 | | |
| Single Pulse Avalanche Energy | | $E_{AS}$ | 11 | | mJ |
| Maximum Power Dissipation[a] | $T_A$ = 25 °C | $P_D$ | 3.3 | 1.7 | W |
| | $T_A$ = 70 °C | | 2.3 | 1.2 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | - 55 to 175 | | °C |

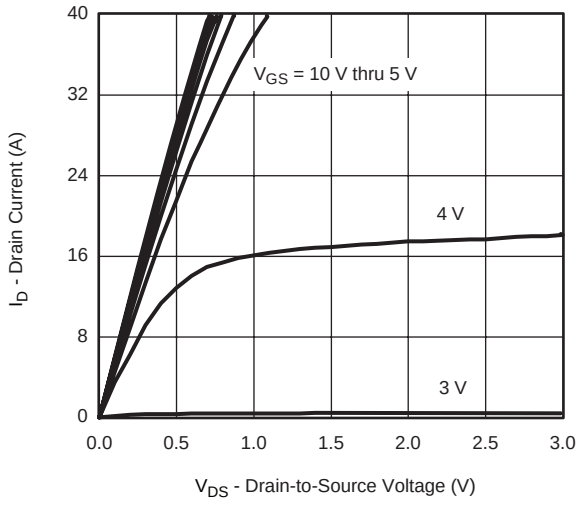
| THERMAL RESISTANCE RATINGS | | | | | |
|---|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Typical** | **Maximum** | **Unit** |
| Maximum Junction-to-Ambient [a] | t ≤ 10 s | $R_{thJA}$ | 36 | 45 | °C/W |
| | Steady State | | 75 | 90 | |
| Maximum Junction-to-Foot (Drain) | Steady State | $R_{thJF}$ | 17 | 20 | |

Notes:
a. Surface Mounted on 1" x 1" FR4 board.

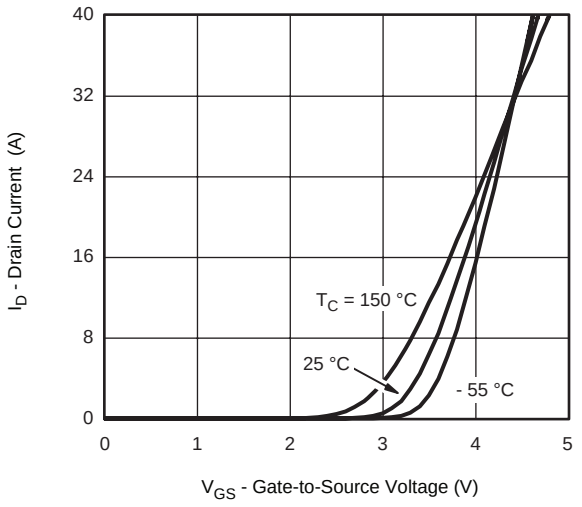
| **SPECIFICATIONS** $T_J$ = 25 °C, unless otherwise noted | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Test Conditions** | **Min.** | **Typ.** | **Max.** | **Unit** |
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{DS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 µA | 60 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 1 | | 3 | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ± 20 V | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V | | | 1 | µA |
| | | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V, $T_J$ = 55 °C | | | 20 | |
| On-State Drain Current[a] | $I_{D(on)}$ | $V_{DS}$ ≥ 5 V, $V_{GS}$ = 10 V | 40 | | | A |
| Drain-Source On-State Resistance[a] | $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 6.0 A | | 0.028 | | Ω |
| | | $V_{GS}$ = 10 V, $I_D$ = 6.0 A, $T_J$ = 125 °C | | 0.032 | | |
| | | $V_{GS}$ = 10 V, $I_D$ = 6.0 A, $T_J$ = 175 °C | | 0.040 | | |
| | | $V_{GS}$ = 4.5 V, $I_D$ = 5.1 A | | 0.033 | | |
| Forward Transconductance[a] | $g_{fs}$ | $V_{DS}$ = 15 V, $I_D$ = 6.0 A | | 25 | | S |
| Diode Forward Voltage[a] | $V_{SD}$ | $I_S$ = 1.7 A, $V_{GS}$ = 0 V | | 0.8 | 1.2 | V |
| **Dynamic[b]** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 30 V, $V_{GS}$ = 10 V, $I_D$ = 6.0 A | | 18 | 27 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 3.4 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 5.3 | | |
| Gate Resistance | $R_g$ | $V_{GS}$ = 0.1 V, f = 5 MHz | 0.5 | 1.4 | 2.4 | Ω |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = 30 V, $R_L$ = 30 Ω<br>$I_D$ ≅ 1 A, $V_{GEN}$ = 10 V, $R_g$ = 6 Ω | | 10 | 20 | ns |
| Rise Time | $t_r$ | | | 10 | 20 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 25 | 50 | |
| Fall Time | $t_f$ | | | 12 | 24 | |
| Source-Drain Reverse Recovery Time | $t_{rr}$ | $I_F$ = 1.7 A, dI/dt = 100 A/µs | | 50 | 80 | |

Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

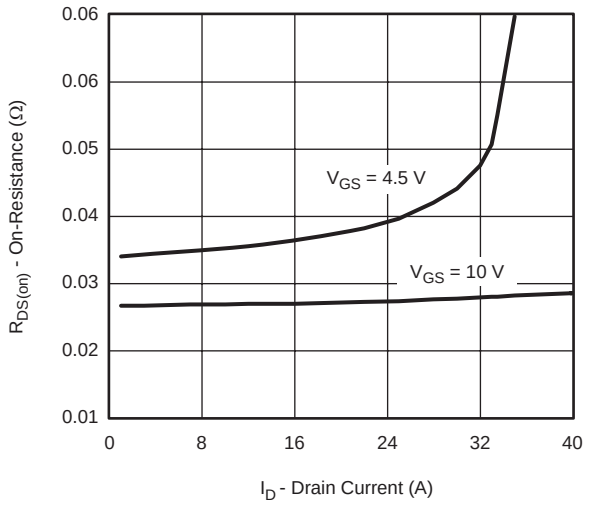



**Output Characteristics**

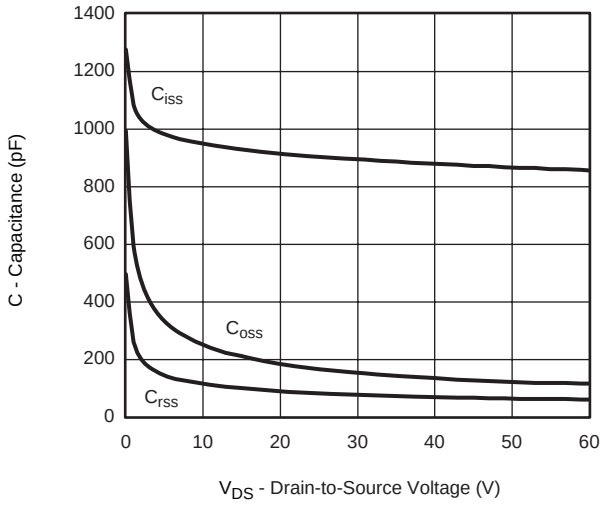



**Transfer Characteristics**

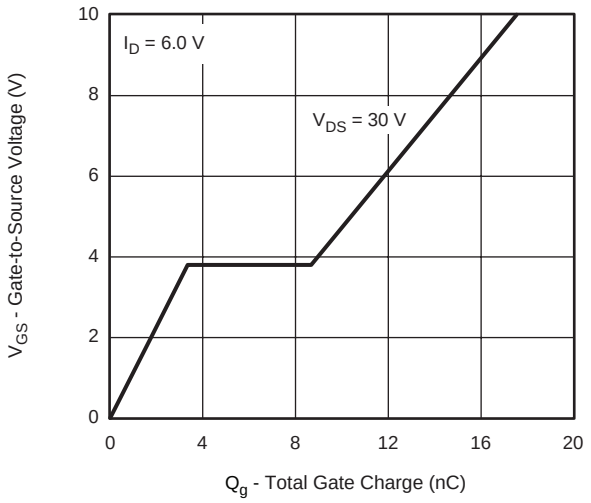
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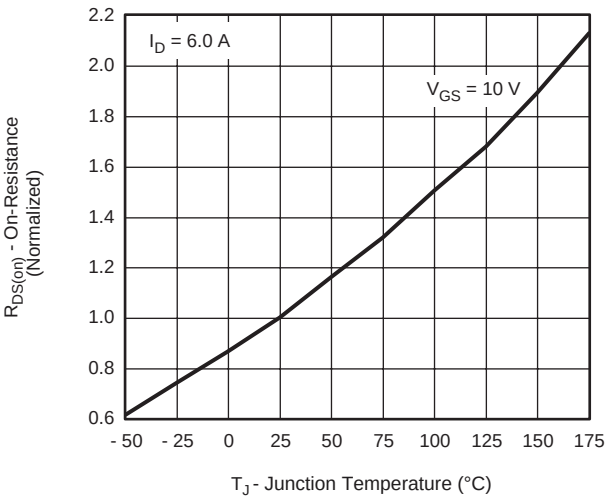

**On-Resistance vs. Drain Current**



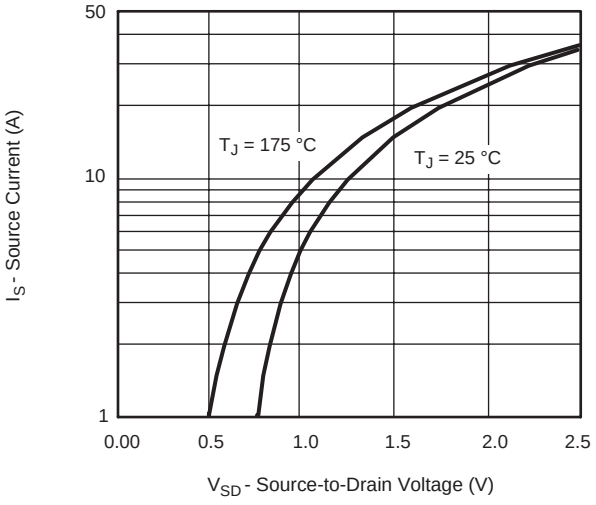

**Capacitance**



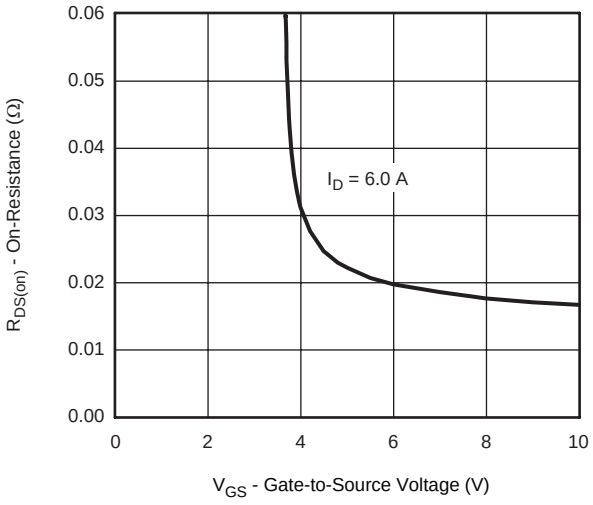

**Gate Charge**




**On-Resistance vs. Junction Temperature**

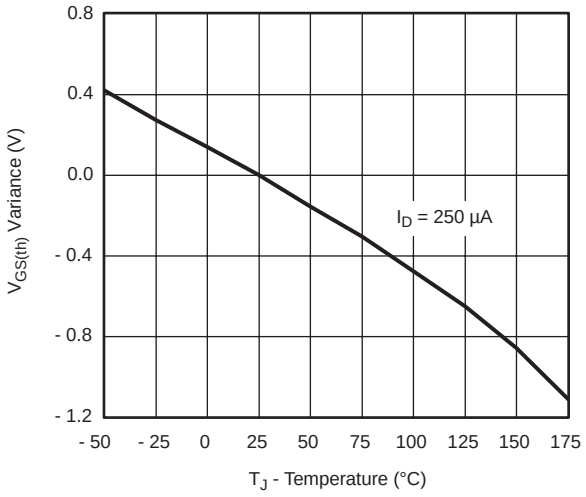



**Source-Drain Diode Forward Voltage**

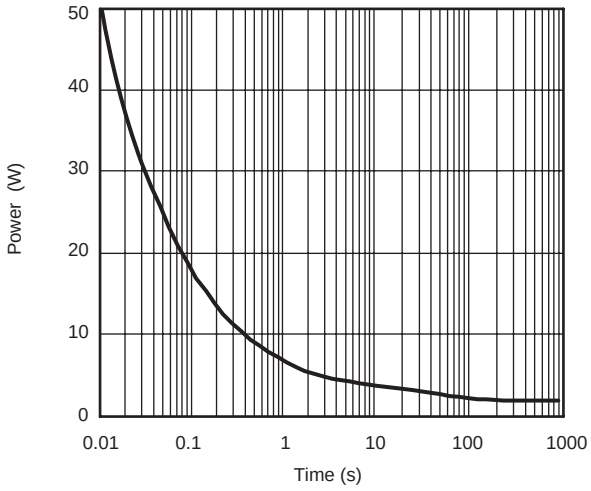



**On-Resistance vs. Gate-to-Source Voltage**

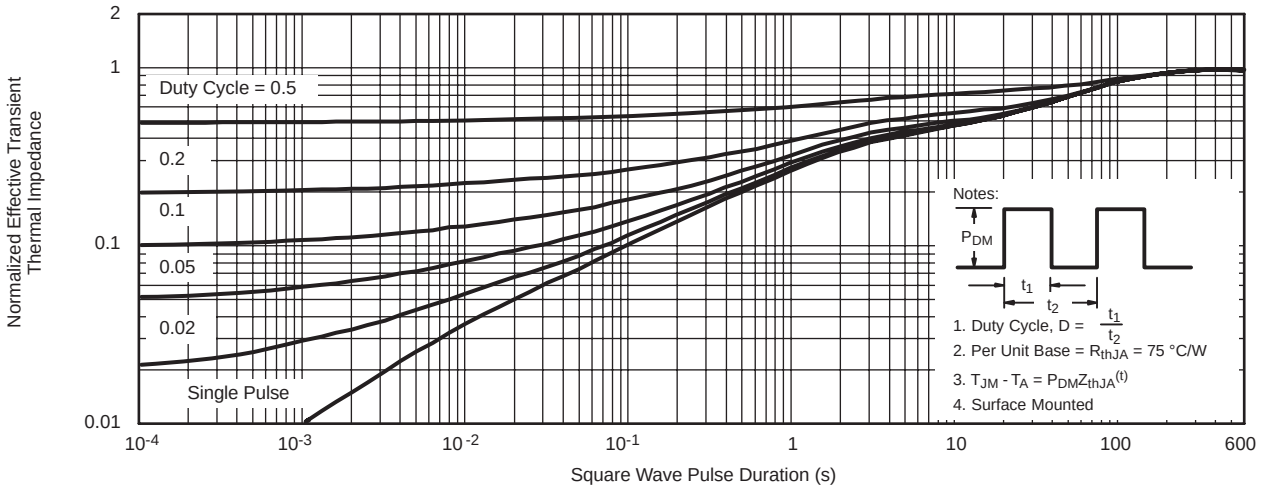
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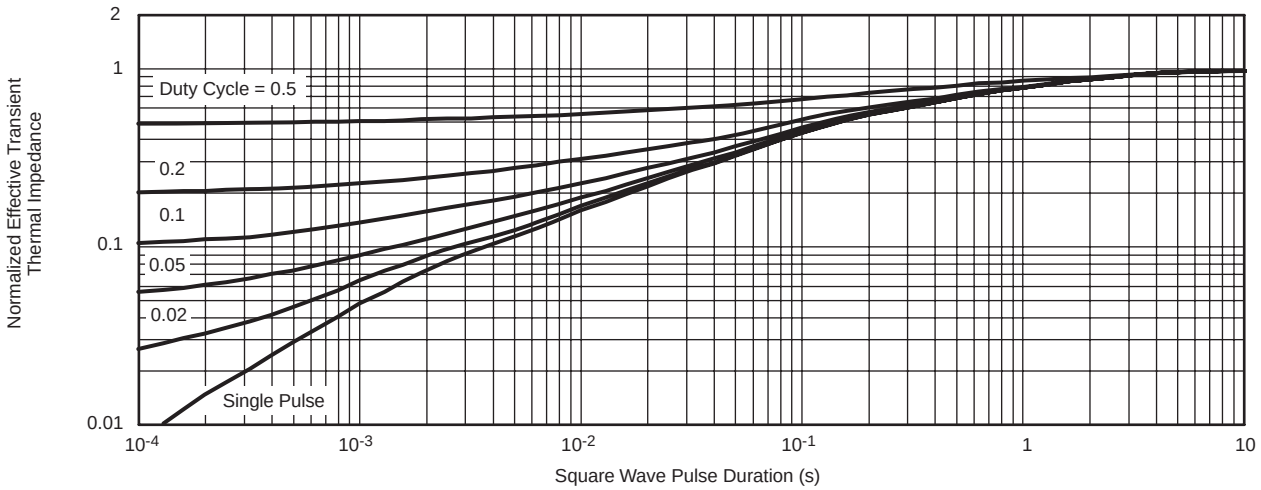

**Threshold Voltage**




**Single Pulse Power**

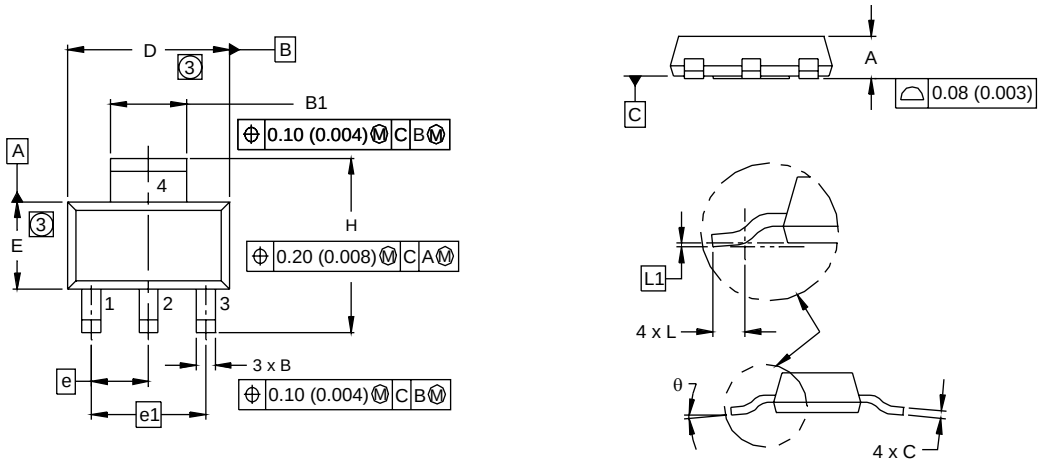



**Normalized Thermal Transient Impedance, Junction-to-Ambient**




**Normalized Thermal Transient Impedance, Junction-to-Foot**

## SOT-223 (HIGH VOLTAGE)




| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| **DIM.** | **MIN.** | **MAX.** | **MIN.** | **MAX.** |
| A | 1.55 | 1.80 | 0.061 | 0.071 |
| B | 0.65 | 0.85 | 0.026 | 0.033 |
| B1 | 2.95 | 3.15 | 0.116 | 0.124 |
| C | 0.25 | 0.35 | 0.010 | 0.014 |
| D | 6.30 | 6.70 | 0.248 | 0.264 |
| E | 3.30 | 3.70 | 0.130 | 0.146 |
| e | 2.30 BSC | | 0.0905 BSC | |
| e1 | 4.60 BSC | | 0.181 BSC | |
| H | 6.71 | 7.29 | 0.264 | 0.287 |
| L | 0.91 | - | 0.036 | - |
| L1 | 0.061 BSC | | 0.0024 BSC | |
| θ | - | 10' | - | 10' |
| ECN: S-82109-Rev. A, 15-Sep-08<br>DWG: 5969 | | | | |

**Notes**

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension do not include mold flash.
4. Outline conforms to JEDEC outline TO-261AA.

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