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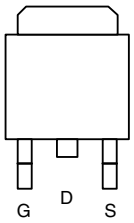
Vishay/Siliconix
SUM90N06-4M4P-E3

For any questions, you can email us directly:
sales@integrated-circuit.com

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

| PRODUCT SUMMARY | | | |
|---|---|---|---|
| $V_{DS}$ (V) | $R_{DS(on)}$ (Ω) | $I_D$ (A) | $Q_g$ (Typ) |
| 60 | 0.0044 at $V_{GS}$ = 10 V | 90[d] | 105 |

**TO-263**




Top View

**Ordering Information:** SUM90N06-4m4P-E3 (Lead (Pb)-free)

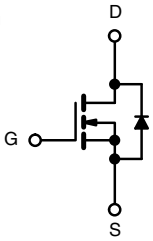
## FEATURES

- TrenchFET® Power MOSFET
- 175 °C Junction Temperatur
- 100 % $R_g$ and UIS Tested
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

## APPLICATIONS

- Power Supply
  - Secondary Synchronous Rectification
- Industrial
- OR-ing




N-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS ($T_C$ = 25 °C, unless otherwise noted) | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Limit** | **Unit** |
| Drain-Source Voltage | | $V_{DS}$ | 60 | V |
| Gate-Source Voltage | | $V_{GS}$ | ± 20 | |
| Continuous Drain Current ($T_J$ = 175 °C) | $T_C$ = 25 °C | $I_D$ | 90[d] | A |
| | $T_C$ = 70 °C | | 90[d] | |
| Pulsed Drain Current | | $I_{DM}$ | 240 | |
| Avalanche Current | | $I_{AS}$ | 70 | |
| Single Avalanche Energy[a] | L = 0.1 mH | $E_{AS}$ | 245 | mJ |
| Maximum Power Dissipation[a] | $T_C$ = 25 °C | $P_D$ | 300[b] | W |
| | $T_A$ = 25 °C[c] | | 3.75 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | - 55 to 175 | °C |

| THERMAL RESISTANCE RATINGS | | | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Limit** | **Unit** |
| Junction-to-Ambient (PCB Mount)[c] | $R_{thJA}$ | 40 | °C/W |
| Junction-to-Case (Drain) | $R_{thJC}$ | 0.5 | |

Notes:
a. Duty cycle ≤ 1 %.
b. See SOA curve for voltage derating.
c. When mounted on 1" square PCB (FR-4 material).
d. Package limited.

# SUM90N06-4m4P

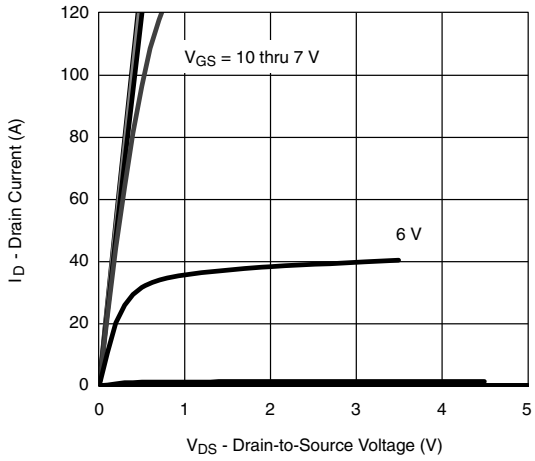
Vishay Siliconix

| **SPECIFICATIONS** ($T_C$ = 25 °C, unless otherwise noted) | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Test Conditions** | **Min.** | **Typ.** | **Max.** | **Unit** |
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{DS}$ | $V_{DS}$ = 0 V, $I_D$ = 250 µA | 60 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 2.5 | | 4.5 | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ± 20 V | | | ± 250 | 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, $T_J$ = 125 °C | | | 50 | |
| | | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V, $T_J$ = 150 °C | | | 250 | |
| On-State Drain Current[a] | $I_{D(on)}$ | $V_{DS}$ ≥ 10 V, $V_{GS}$ = 10 V | 70 | | | A |
| Drain-Source On-State Resistance[a] | $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 20 A | | 0.0036 | 0.0044 | Ω |
| | | $V_{GS}$ = 10 V, $I_D$ = 20 A, $T_J$ = 125 °C | | 0.0059 | 0.0077 | |
| Forward Transconductance[a] | $g_{fs}$ | $V_{DS}$ = 15 V, $I_D$ = 20 A | | 60 | | S |
| **Dynamic[b]** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 30 V, f = 1 MHz | | 6190 | | pF |
| Output Capacitance | $C_{oss}$ | | | 990 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 340 | | |
| Total Gate Charge[c] | $Q_g$ | $V_{DS}$ = 30 V, $V_{GS}$ = 10 V, $I_D$ = 85 A | | 105 | 160 | nC |
| Gate-Source Charge[c] | $Q_{gs}$ | | | 29 | | |
| Gate-Drain Charge[c] | $Q_{gd}$ | | | 28 | | |
| Gate Resistance | $R_g$ | f = 1 MHz | | 1.4 | 2.8 | Ω |
| Turn-On Delay Time[c] | $t_{d(on)}$ | $V_{DD}$ = 30 V, $R_L$ = 0.4 Ω<br>$I_D$ ≅ 85 A, $V_{GEN}$ = 10 V, $R_g$ = 1 Ω | | 23 | 35 | ns |
| Rise Time[c] | $t_r$ | | | 15 | 25 | |
| Turn-Off Delay Time[c] | $t_{d(off)}$ | | | 36 | 55 | |
| Fall Time[c] | $t_f$ | | | 8 | 15 | |
| **Source-Drain Diode Ratings and Characteristics** ($T_C$ = 25 °C)[b] | | | | | | |
| Continuous Current | $I_S$ | | | | 85 | A |
| Pulsed Current | $I_{SM}$ | | | | 240 | |
| Forward Voltage[a] | $V_{SD}$ | $I_F$ = 30 A, $V_{GS}$ = 0 V | | 0.84 | 1.5 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$ = 75 A, di/dt = 100 A/µs | | 61 | 100 | ns |
| Peak Reverse Recovery Current | $I_{RM(REC)}$ | | | 3.0 | 4.5 | A |
| Reverse Recovery Charge | $Q_{rr}$ | | | 91 | 140 | µC |

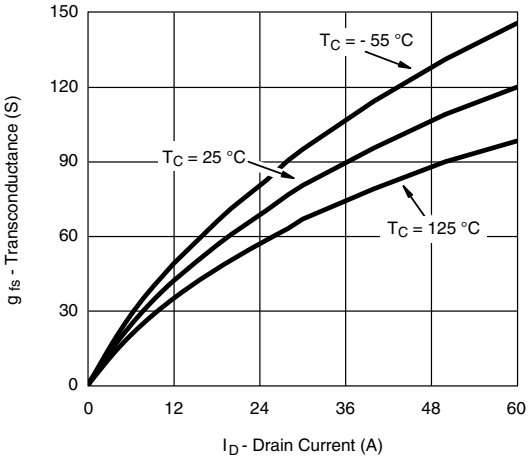
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

*Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

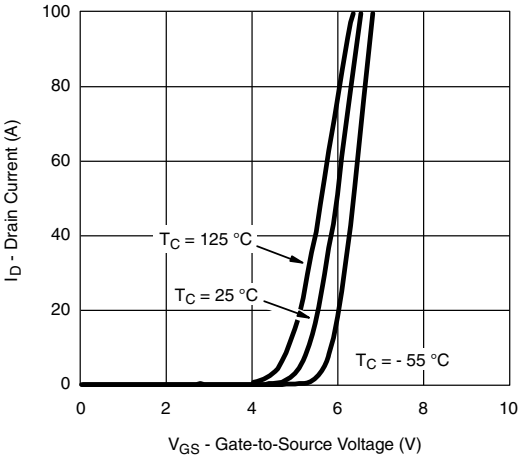
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



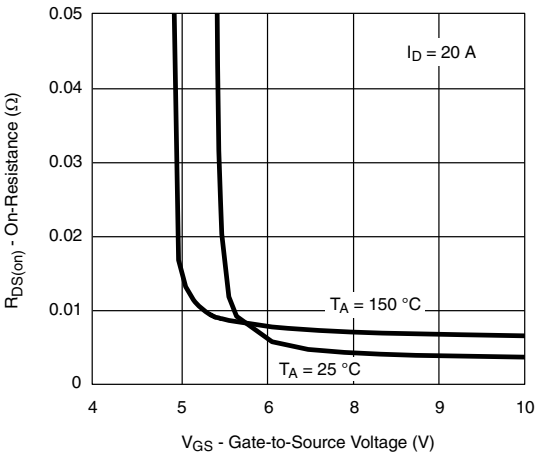

**Output Characteristics**



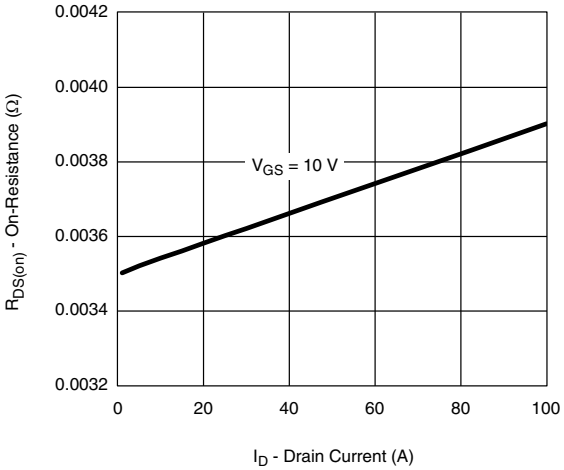

**Transconductance**



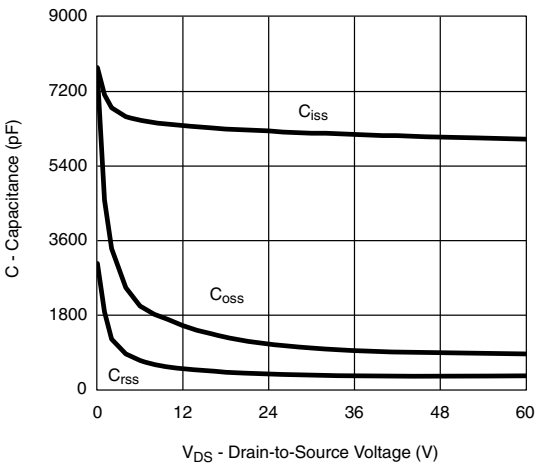

**Transfer Characteristics**




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

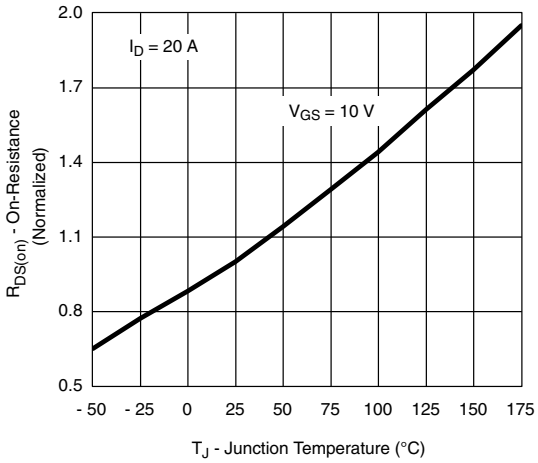



**On-Resistance vs. Drain Current**

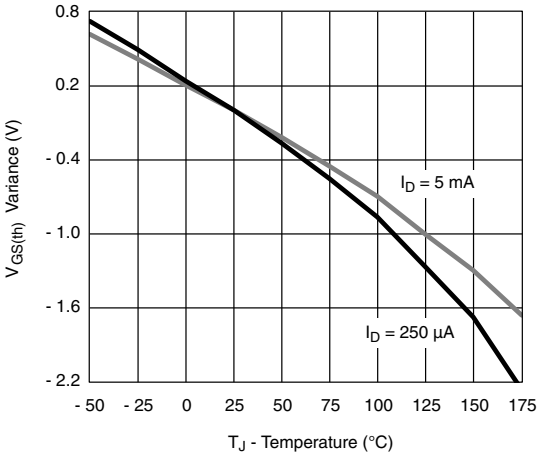



**Capacitance**

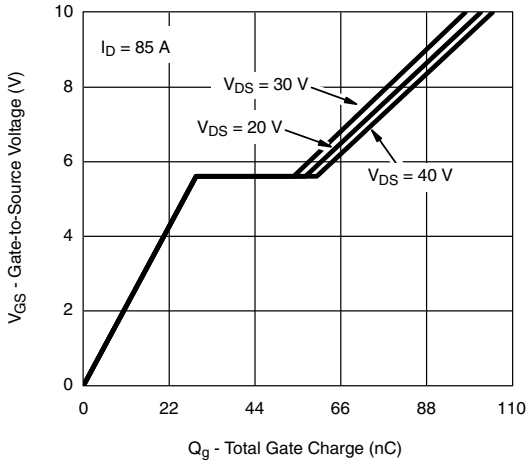
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



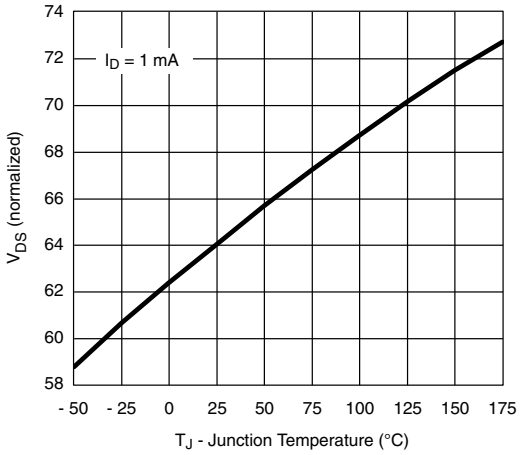

**On-Resistance vs. Junction Temperature**



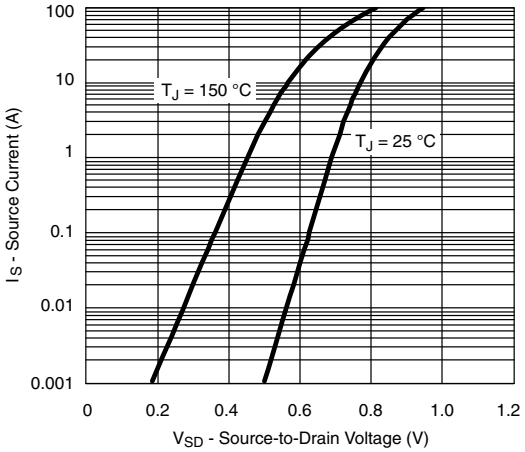

**Threshold Voltage**



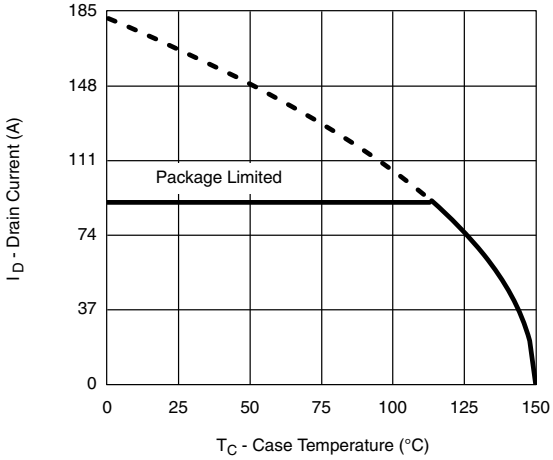

**Gate Charge**




**On-Resistance vs. Junction Temperature**

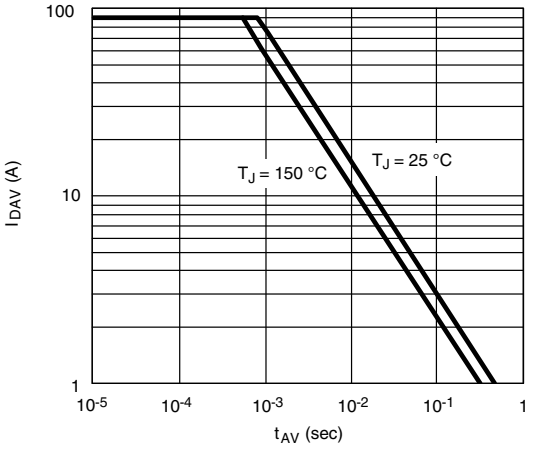



**Source-Drain Diode Forward Voltage**

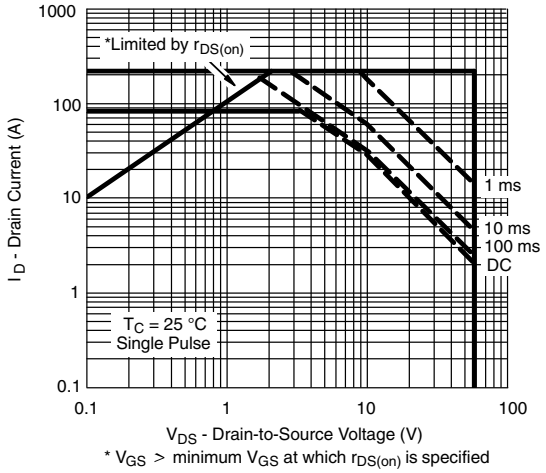



**Maximum Drain Current vs. Case Temperature**

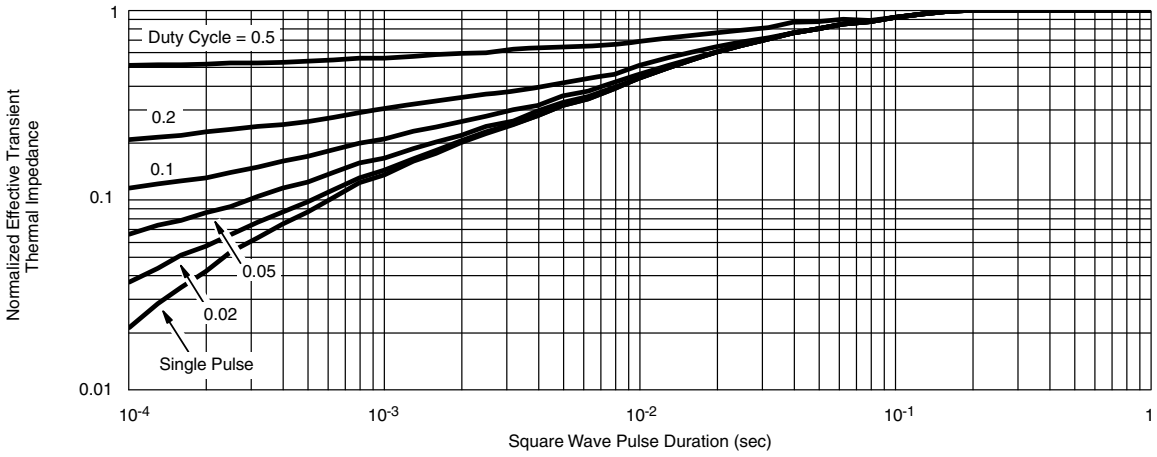
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)




**Single Pulse Avalanche Current Capability vs. Time**




**Safe Operating Area**




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

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