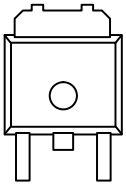
# N-Channel 30-V (D-S), 175°C MOSFET

## Product Summary

| $V_{DS}$ (V) | $r_{DS(on)}$ (Ω) | $I_D$ (A) |
|---|---|---|
| 30 | 0.030 @ $V_{GS}$ = 10 V | ±30 |
| | 0.045 @ $V_{GS}$ = 4.5 V | ±25 |

175°C Rated
Maximum Junction Temperature
TrenchFET™
Power MOSFETs

**TO-252**

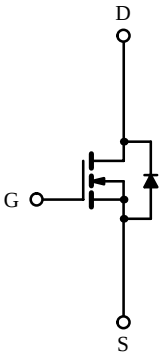


G D S

Top View

Drain Connected to Tab

Order Number:
SUD30N03-30




N-Channel MOSFET

## Absolute Maximum Ratings ($T_C$ = 25°C Unless Otherwise Noted)

| Parameter | | Symbol | Limit | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | |
| Continuous Drain Current ($T_J$ = 175°C) | $T_C$ = 25°C | $I_D$ | ±30 | A |
| | $T_C$ = 100°C | | ±21 | |
| Pulsed Drain Current | | $I_{DM}$ | ±40 | |
| Continuous Source Current (Diode Conduction) | | $I_S$ | 30 | |
| Maximum Power Dissipation | $T_C$ = 25°C | $P_D$ | 50 | W |
| | $T_A$ = 25°C | | 3[a] | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | –55 to 175 | °C |

## Thermal Resistance Ratings

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Maximum Junction-to-Ambient | $R_{thJA}$ | 50 | °C/W |
| Maximum Junction-to-Case | $R_{thJC}$ | 3.0 | |

Notes
a. Surface Mounted on 4” x 4” FR4 Board.

Updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #70268.

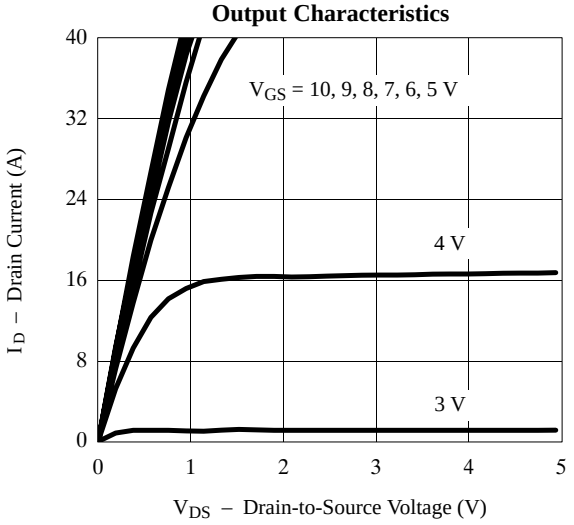
## Specifications ($T_J$ = 25°C Unless Otherwise Noted)

| Parameter | Symbol | Test Condition | Min | Typ[a] | Max | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 µA | 30 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 1.0 | | | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±20 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 30 V, $V_{GS}$ = 0 V | | | 1 | µA |
| | | $V_{DS}$ = 30 V, $V_{GS}$ = 0 V, $T_J$ = 125°C | | | 50 | |
| | | $V_{DS}$ = 30 V, $V_{GS}$ = 0 V, $T_J$ = 175°C | | | 150 | |
| On-State Drain Current[b] | $I_{D(on)}$ | $V_{DS}$ = 5 V, $V_{GS}$ = 10 V | 30 | | | A |
| Drain-Source On-State Resistance[b] | $r_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 15 A | | 0.020 | 0.030 | Ω |
| | | $V_{GS}$ = 10 V, $I_D$ = 15 A, $T_J$ = 125°C | | 0.033 | 0.050 | |
| | | $V_{GS}$ = 10 V, $I_D$ = 15 A, $T_J$ = 175°C | | 0.036 | 0.054 | |
| | | $V_{GS}$ = 4.5 V, $I_D$ = 12.5 A | | 0.030 | 0.045 | |
| Forward Transconductance[b] | $g_{fs}$ | $V_{DS}$ = 15 V, $I_D$ = 15 A | 10 | 22 | | S |
| **Dynamic[a]** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 25 V, f = 1 MHz | | 1170 | | pF |
| Output Capacitance | $C_{oss}$ | | | 320 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 60 | | |
| Total Gate Charge[c] | $Q_g$ | $V_{DS}$ = 15 V, $V_{GS}$ = 10 V, $I_D$ = 30 A | | 18 | 35 | nC |
| Gate-Source Charge[c] | $Q_{gs}$ | | | 5.5 | | |
| Gate-Drain Charge[c] | $Q_{gd}$ | | | 2 | | |
| Turn-On Delay Time[c] | $t_{d(on)}$ | $V_{DD}$ = 15 V, $R_L$ = 0.5 Ω<br>$I_D$ ≅ 30 A, $V_{GEN}$ = 10 V, $R_G$ = 7.5 Ω | | 10 | 20 | ns |
| Rise Time[c] | $t_r$ | | | 10 | 20 | |
| Turn-Off Delay Time[c] | $t_{d(off)}$ | | | 25 | 40 | |
| Fall Time[c] | $t_f$ | | | 15 | 30 | |
| **Source-Drain Diode Ratings and Characteristic ($T_C$ = 25°C)** | | | | | | |
| Pulsed Current | $I_{SM}$ | | | | 40 | A |
| Diode Forward Voltage[b] | $V_{SD}$ | $I_F$ = 30 A, $V_{GS}$ = 0 V | | 1.1 | 1.5 | V |
| Source-Drain Reverse Recovery Time | $t_{rr}$ | $I_F$ = 30 A, di/dt = 100 A/µs | | 50 | 100 | ns |

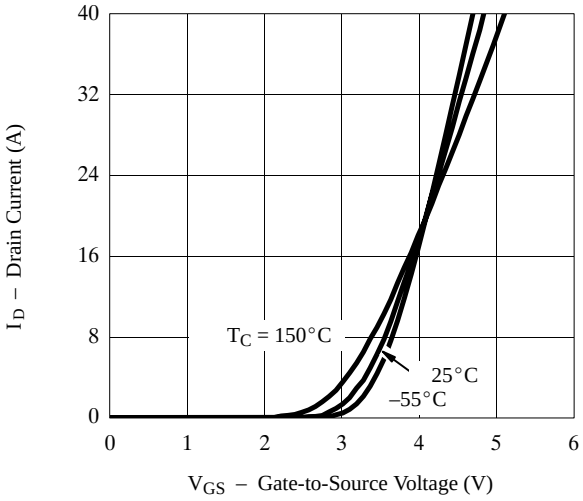
Notes
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.
c. Independent of operating temperature.

# Typical Characteristics (25°C Unless Otherwise Noted)

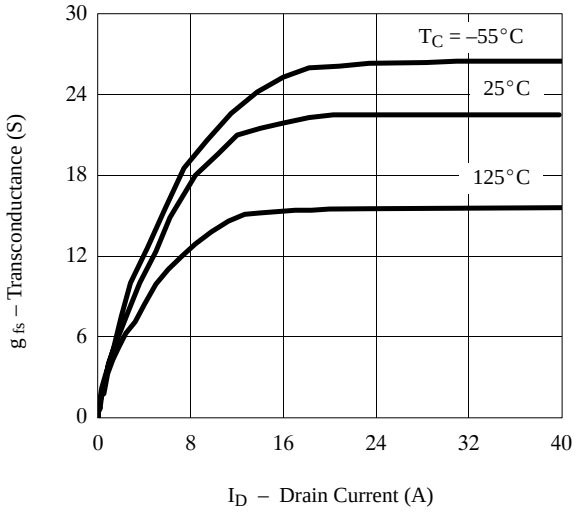
**Output Characteristics**



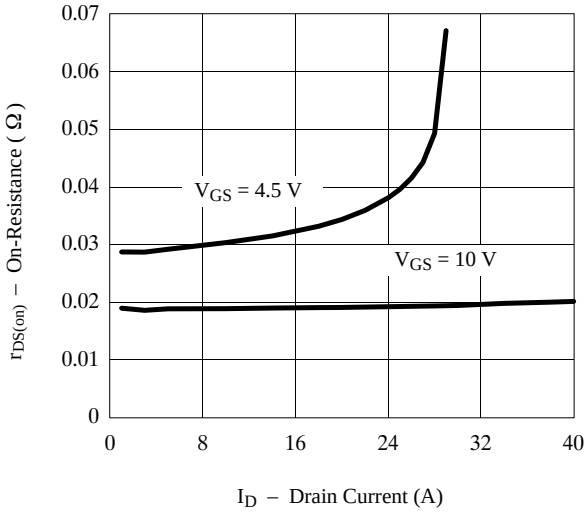

**Transfer Characteristics**



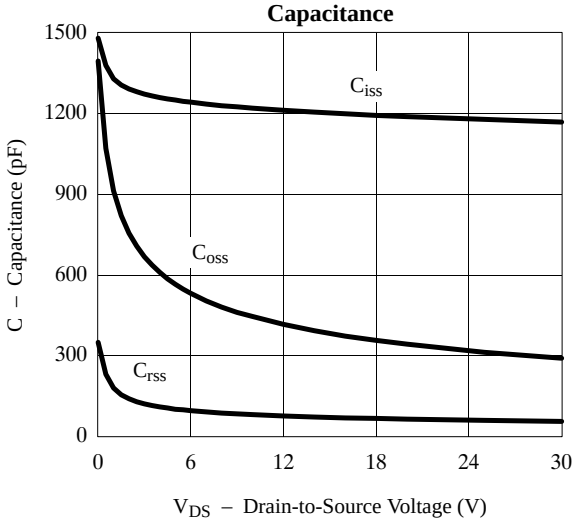

**Transconductance**



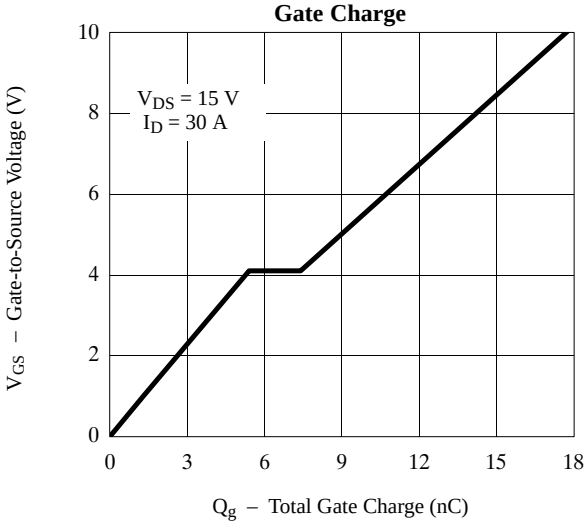

**On-Resistance vs. Drain Current**




**Capacitance**

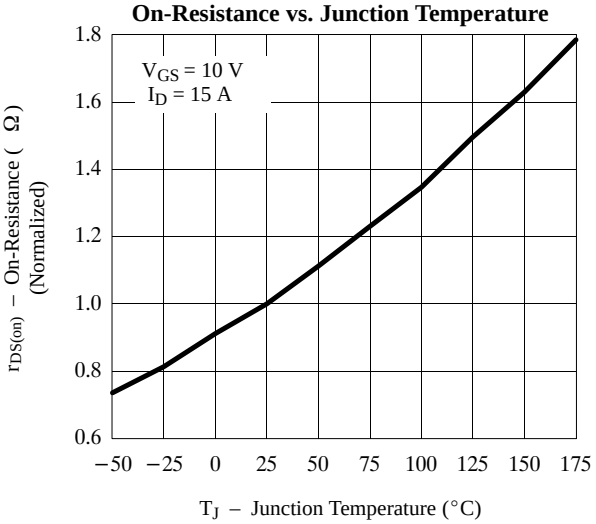



**Gate Charge**

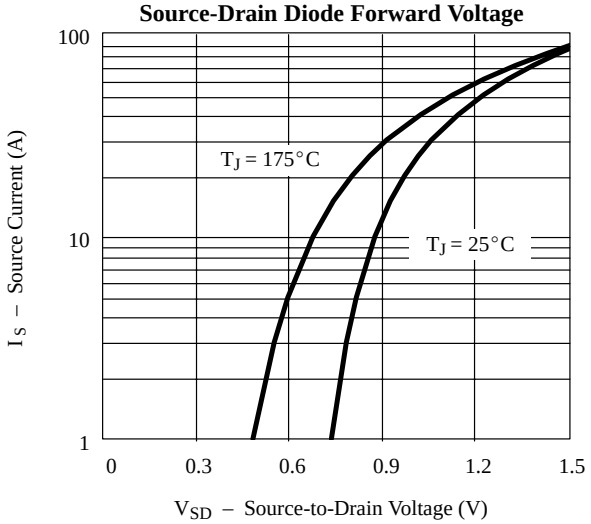


# Typical Characteristics (25°C Unless Otherwise Noted)

**On-Resistance vs. Junction Temperature**

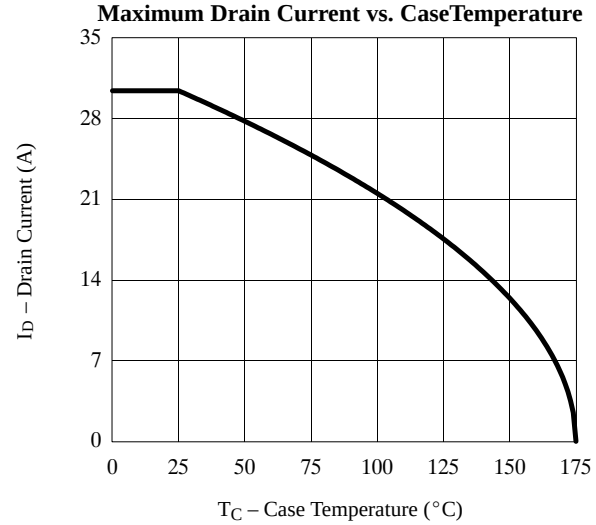



**Source-Drain Diode Forward Voltage**

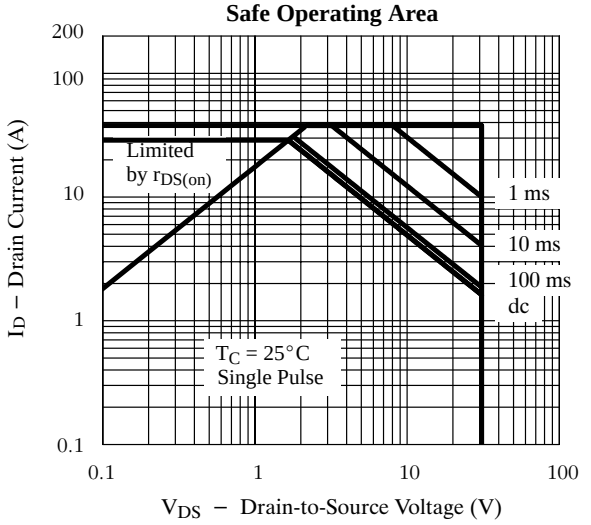



# Thermal Ratings

**Maximum Drain Current vs. CaseTemperature**




**Safe Operating Area**




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