# N-Channel 30-V (D-S) 175°C MOSFET

| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DS}$ (V) | $r_{DS(on)}$ (Ω) | $I_D$ (A)[b] |
| 30 | 0.006 @ $V_{GS}$ = 10 V | 70 |
| | 0.009 @ $V_{GS}$ = 4.5 V | 70 |

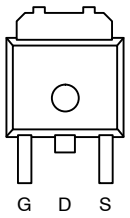
## FEATURES

- TrenchFET® Power MOSFET
- High Current
- 100% $R_g$ Tested

## APPLICATIONS

- DC/DC Converters
  - Optimized For Low Side
- Synchronous Rectifiers

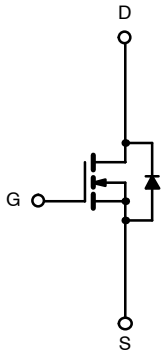
**TO-252**




Top View

Drain Connected to Tab

Ordering Information: SUD70N03-06P




N-Channel MOSFET

## ABSOLUTE MAXIMUM RATINGS ($T_A$ = 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[a] | $T_C$ = 25°C | $I_D$ | 70 | A |
| | $T_C$ = 100°C | | 70[b] | |
| Pulsed Drain Current | | $I_{DM}$ | 100 | |
| Continuous Source Current (Diode Conduction)[a] | | $I_S$ | 27 | |
| Avalanche Current, single pulse | L = 0.1 mH | $I_{AS}$ | 45 | |
| Avalanche Energy, single pulse | | $E_{AS}$ | 101 | mJ |
| Maximum Power Dissipation | $T_C$ = 25°C | $P_D$ | 88 | W |
| | $T_A$ = 25°C | | 8.3[a] | |
| 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 sec | $R_{thJA}$ | 15 | 18 | °C/W |
| | Steady State | | 40 | 50 | |
| Maximum Junction-to-Case | | $R_{thJC}$ | 1.4 | 1.7 | |

Notes
a. Surface Mounted on FR4 Board, t ≤ 10 sec.
b. Limited by package.

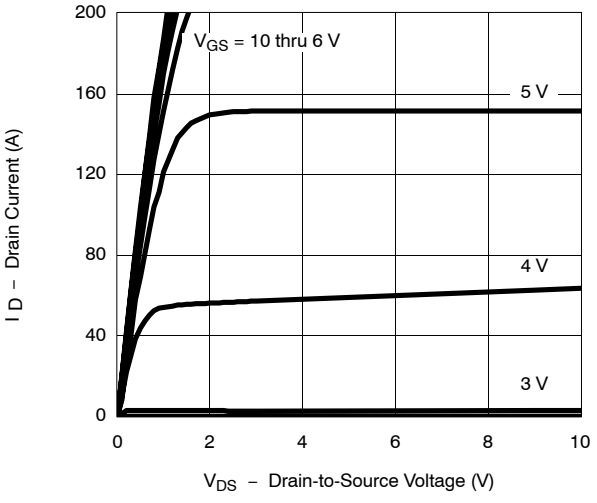
## SPECIFICATIONS ($T_J$ = 25°C UNLESS OTHERWISE NOTED)

| 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 | | 3.0 | |
| 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 | |
| On-State Drain Current[b] | $I_{D(on)}$ | $V_{DS}$ = 5 V, $V_{GS}$ = 10 V | 50 | | | A |
| Drain-Source On-State Resistance[b] | $r_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 20 A | | 0.0046 | 0.006 | Ω |
| | | $V_{GS}$ = 10 V, $I_D$ = 20 A, $T_J$ = 125°C | | | 0.0105 | |
| | | $V_{GS}$ = 4.5 V, $I_D$ = 20 A | | 0.0072 | 0.009 | |
| Forward Transconductance[b] | $g_{fs}$ | $V_{DS}$ = 15 V, $I_D$ = 20 A | 20 | | | S |
| **Dynamic[a]** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 25 V, f = 1 MHz | | 3100 | | pF |
| Output Capacitance | $C_{oss}$ | | | 565 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 255 | | |
| Total Gate Charge[c] | $Q_g$ | $V_{DS}$ = 15 V, $V_{GS}$ = 4.5 V, $I_D$ = 50 A | | 21 | 30 | nC |
| Gate-Source Charge[c] | $Q_{gs}$ | | | 10 | | |
| Gate-Drain Charge[c] | $Q_{gd}$ | | | 7.5 | | |
| Gate Resistance | $R_g$ | f = 1 MHz | 0.9 | 2.0 | 3.4 | Ω |
| Turn-On Delay Time[c] | $t_{d(on)}$ | $V_{DD}$ = 15 V, $R_L$ = 0.3 Ω<br>$I_D$ ≅ 50 A, $V_{GEN}$ = 10 V, $R_g$ = 2.5 Ω | | 12 | 20 | ns |
| Rise Time[c] | $t_r$ | | | 12 | 20 | |
| Turn-Off Delay Time[c] | $t_{d(off)}$ | | | 30 | 45 | |
| Fall Time[c] | $t_f$ | | | 10 | 15 | |
| **Source-Drain Diode Ratings and Characteristic ($T_C$ = 25°C)** | | | | | | |
| Pulsed Current | $I_{SM}$ | | | | 100 | A |
| Diode Forward Voltage[b] | $V_{SD}$ | $I_F$ = 100 A, $V_{GS}$ = 0 V | | 1.2 | 1.5 | V |
| Source-Drain Reverse Recovery Time | $t_{rr}$ | $I_F$ = 50 A, di/dt = 100 A/μs | | 35 | 70 | ns |

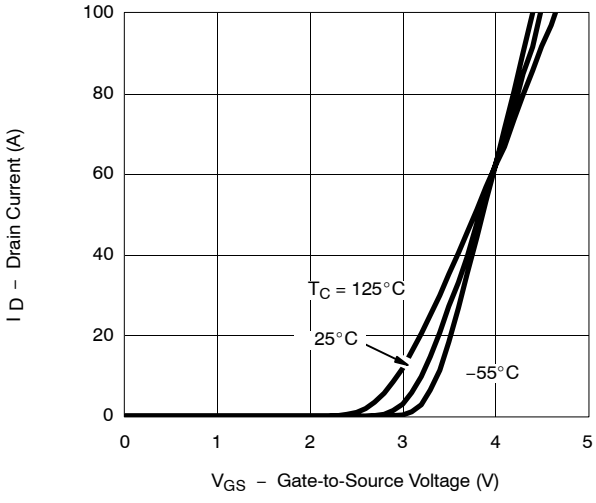
Notes
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
c. Independent of operating temperature.

## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

**Output Characteristics**

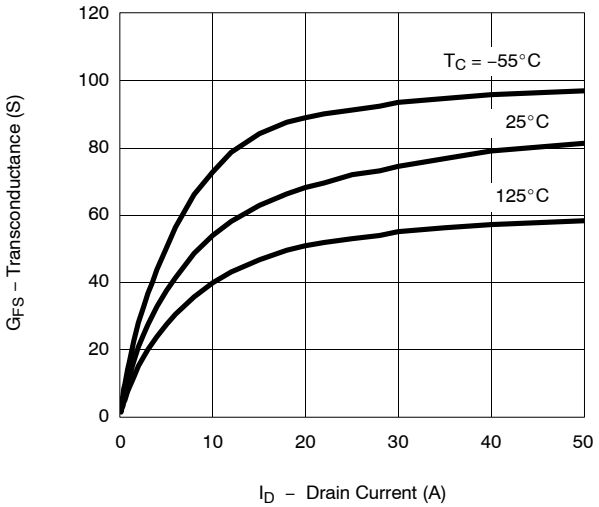



**Transfer Characteristics**

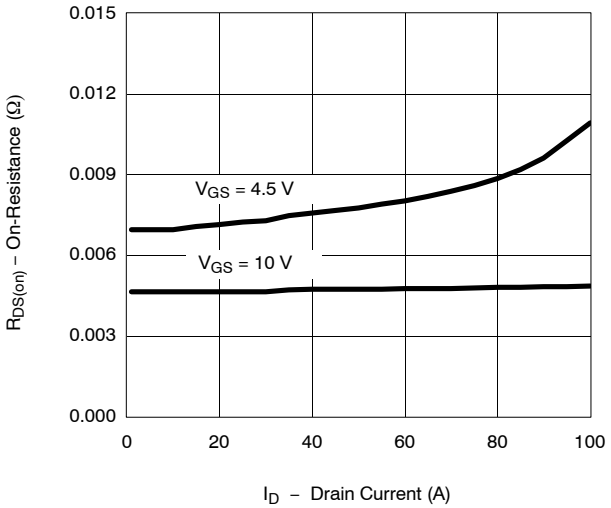


## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

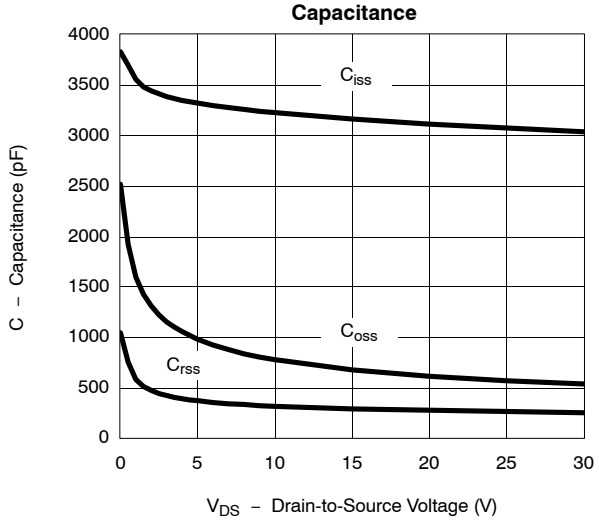
**Transconductance**



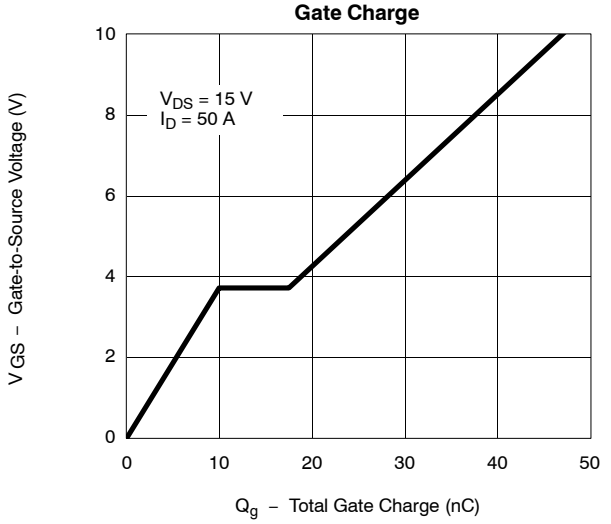

**On-Resistance vs. Drain Current**



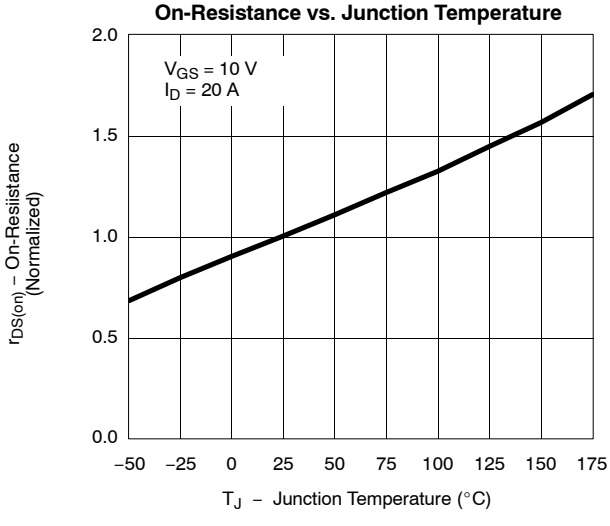

**Capacitance**



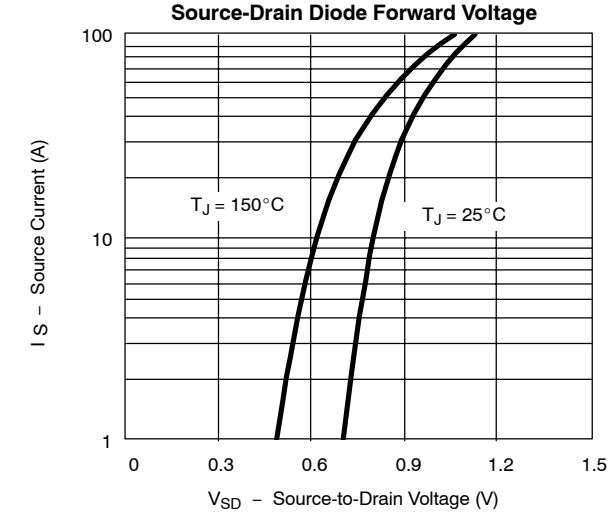

**Gate Charge**




**On-Resistance vs. Junction Temperature**

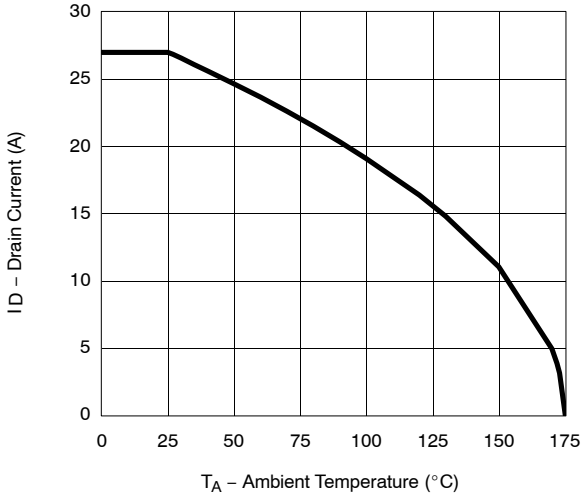



**Source-Drain Diode Forward Voltage**

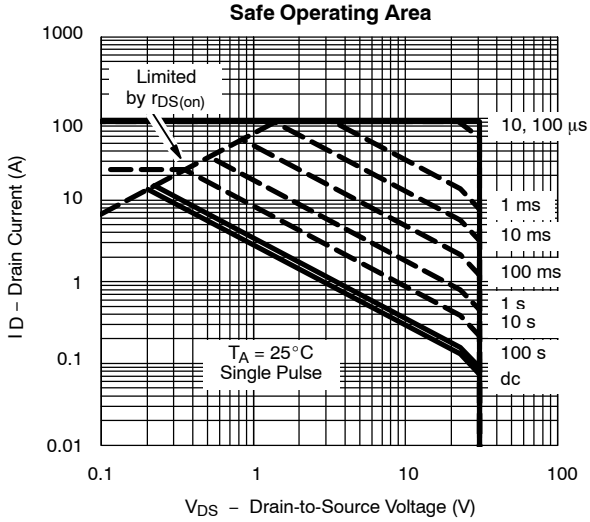


## THERMAL RATINGS

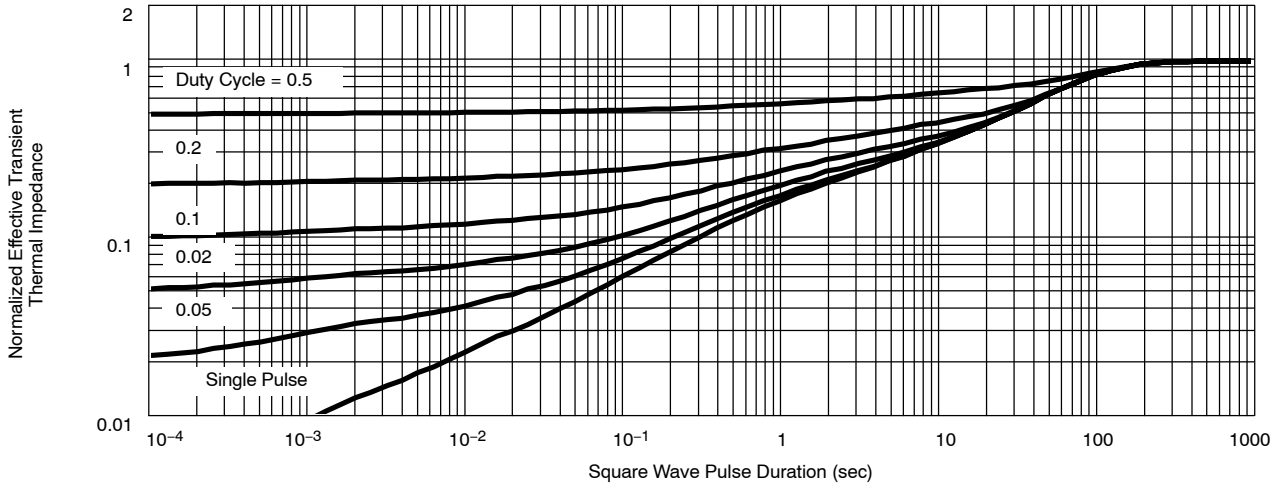
**Maximum Avalanche Drain Current vs. Ambient Temperature**



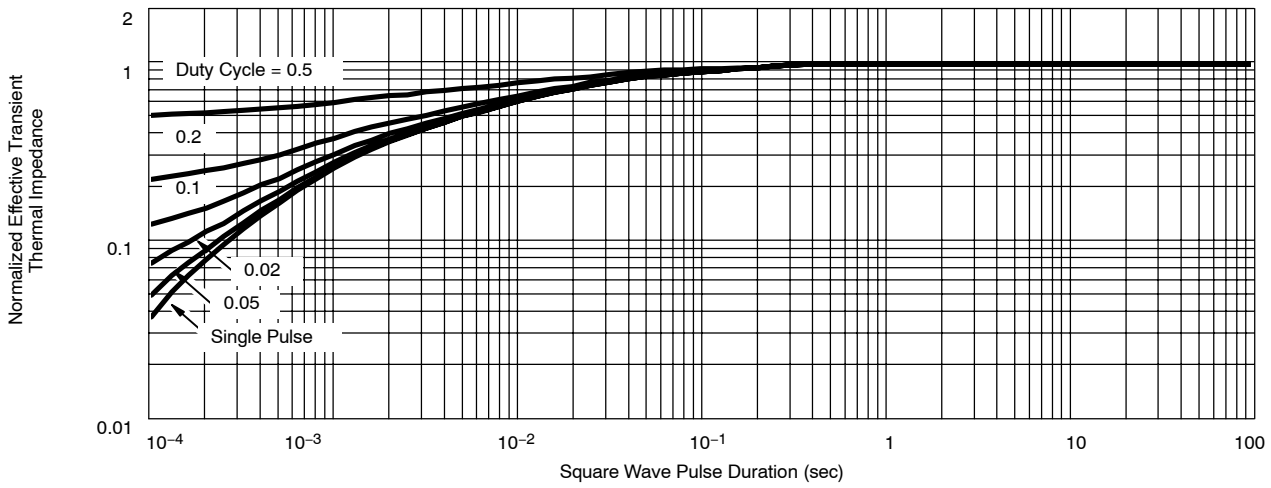

**Safe Operating Area**




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




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



# Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.

# Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.