



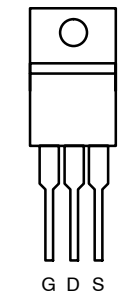
N-Channel 30-V (D-S) 175°C MOSFET

| PRODUCT SUMMARY | | |
|-------------------|---------------------------|------------------------|
| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ (Ω) | I_D (A) ^a |
| 30 | 0.0043 @ $V_{GS} = 10$ V | 85 ^a |
| | 0.007 @ $V_{GS} = 4.5$ V | 85 ^a |

FEATURES

- TrenchFET® Power MOSFET
- 175°C Maximum Junction Temperature
- TO-263 (D²PAK) 100% R_g Tested

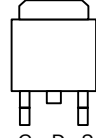
TO-220AB



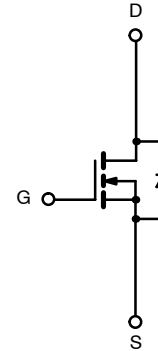
Top View
SUP85N03-04P

DRAIN connected to TAB

TO-263
(D²PAK)



Top View
SUB85N03-04P



N-Channel MOSFET

Ordering Information: SUP85N03-04P (TO-220AB)
 SUB85N03-04P (TO-263, D²PAK)
 SUB85N03-04P—E3 (TO-263, D²PAK, Lead Free)

| ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) | | | | |
|---|----------------|--|------------------|---|
| Parameter | Symbol | Limit | Unit | |
| Drain-Source Voltage | V_{DS} | 30 | V | |
| Gate-Source Voltage | V_{GS} | ± 20 | | |
| Continuous Drain Current ($T_J = 175^\circ\text{C}$) | I_D | $T_C = 25^\circ\text{C}$ | 85 ^a | A |
| | | $T_C = 100^\circ\text{C}$ | 85 ^a | |
| Pulsed Drain Current | I_{DM} | 240 | | |
| Avalanche Current | I_{AR} | 75 | | |
| Repetitive Avalanche Energy ^b | E_{AR} | 280 | mJ | |
| Maximum Power Dissipation ^b | P_D | $T_C = 25^\circ\text{C}$ (TO-220AB and TO-263) | 166 ^c | W |
| | | $T_A = 25^\circ\text{C}$ (TO-263) ^d | 3.75 | |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | -55 to 175 | $^\circ\text{C}$ | |

| THERMAL RESISTANCE RATINGS | | | | |
|----------------------------|------------|---------------------------------|------|--------------------|
| Parameter | Symbol | Limit | Unit | |
| Junction-to-Ambient | R_{thJA} | PCB Mount (TO-263) ^d | 40 | $^\circ\text{C/W}$ |
| | | Free Air (TO-220AB) | 62.5 | |
| Junction-to-Case | R_{thJC} | 0.9 | | |

Notes

- Package limited.
- Duty cycle $\leq 1\%$.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).



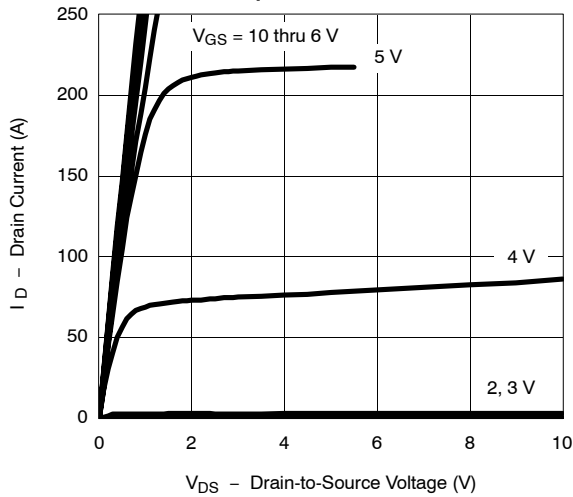
| SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED) | | | | | | |
|---|----------------------|---|-----|--------|--------|------|
| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V _{(BR)DSS} | V _{DS} = 0 V, I _D = 250 μA | 30 | | | V |
| Gate-Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250 μA | 1 | 2 | 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} = 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 | | | 250 | |
| On-State Drain Current ^a | I _{D(on)} | V _{DS} ≥ 5 V, V _{GS} = 10 V | 120 | | | A |
| Drain-Source On-State Resistance ^a | r _{DS(on)} | V _{GS} = 10 V, I _D = 30 A | | 0.0035 | 0.0043 | Ω |
| | | V _{GS} = 10 V, I _D = 30 A, T _J = 125 °C | | | 0.0065 | |
| | | V _{GS} = 10 V, I _D = 30 A, T _J = 175 °C | | | 0.008 | |
| | | V _{GS} = 4.5 V, I _D = 20 A | | 0.0055 | 0.007 | |
| Forward Transconductance ^a | g _{fs} | V _{DS} = 15 V, I _D = 30 A | 30 | | | S |
| Dynamic^b | | | | | | |
| Input Capacitance | C _{iss} | V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz | | 4500 | | pF |
| Output Capacitance | C _{oss} | | | 1380 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 615 | | |
| Gate Resistance ^d | R _g | | 0.7 | | 3.8 | Ω |
| Total Gate Charge ^b | Q _g | V _{DS} = 15 V, V _{GS} = 10 V, I _D = 85 A | | 71 | 90 | nC |
| Gate-Source Charge ^b | Q _{gs} | | | 15 | | |
| Gate-Drain Charge ^b | Q _{gd} | | | 16 | | |
| Turn-On Delay Time ^b | t _{d(on)} | V _{DD} = 15 V, R _L = 0.18 Ω I _D ≅ 85 A, V _{GEN} = 10 V, R _g = 2.5 Ω | | 15 | 23 | ns |
| Rise Time ^b | t _r | | | 12 | 18 | |
| Turn-Off Delay Time ^b | t _{d(off)} | | | 50 | 75 | |
| Fall Time ^b | t _f | | | 22 | 35 | |
| Source-Drain Diode Ratings and Characteristics (T_C = 25 °C)^c | | | | | | |
| Continuous Current | I _S | | | | 85 | A |
| Pulsed Current | I _{SM} | | | | 240 | |
| Forward Voltage ^a | V _{SD} | I _F = 85 A, V _{GS} = 0 V | | 1.1 | 1.5 | V |
| Reverse Recovery Time | t _{rr} | I _F = 85 A, di/dt = 100 A/μs | | 42 | 70 | ns |
| Peak Reverse Recovery Current | I _{RM} | | | 1.4 | 2.1 | A |
| Reverse Recovery Charge | Q _{rr} | | | 0.03 | 0.06 | μC |

Notes

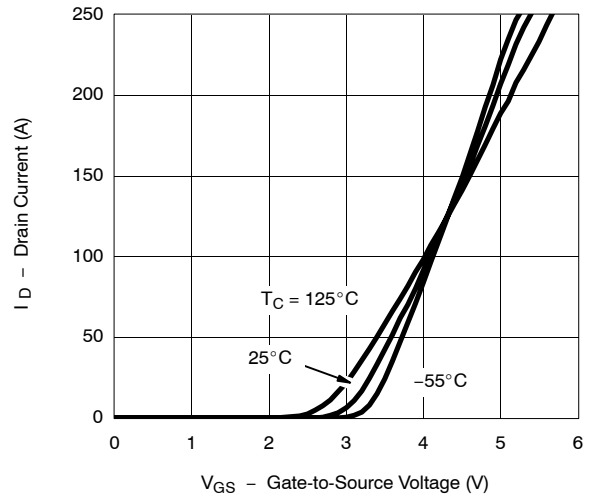
- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- b. Independent of operating temperature.
- c. Guaranteed by design, not subject to production testing.
- d. TO-263 (D²PAK) only.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

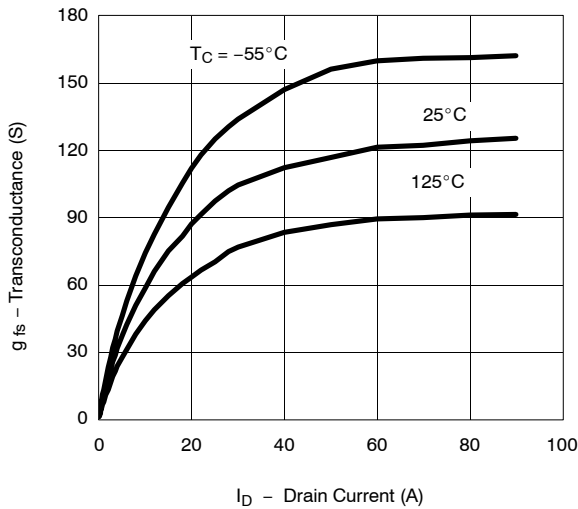
Output Characteristics



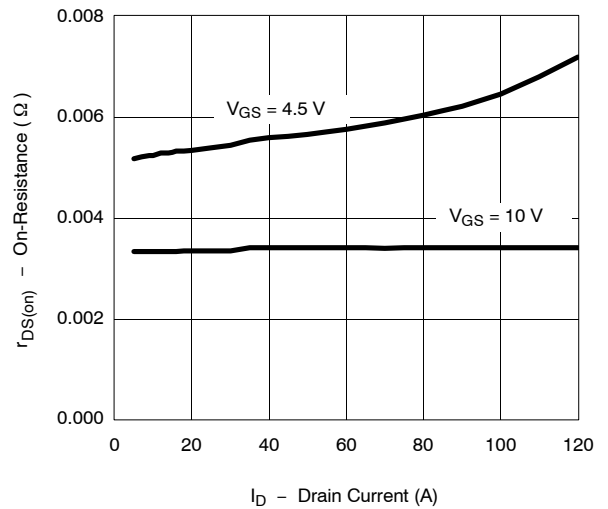
Transfer Characteristics



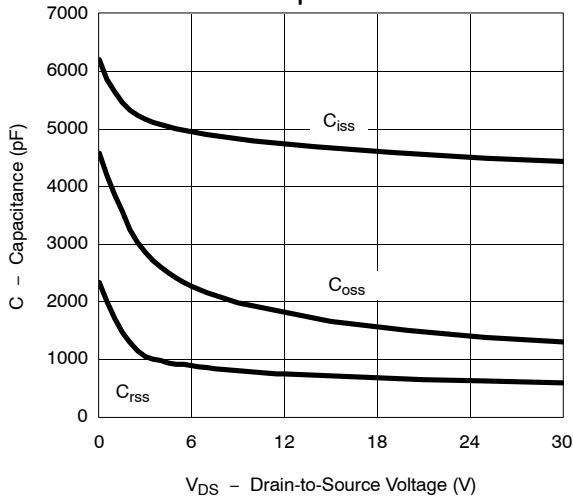
Transconductance



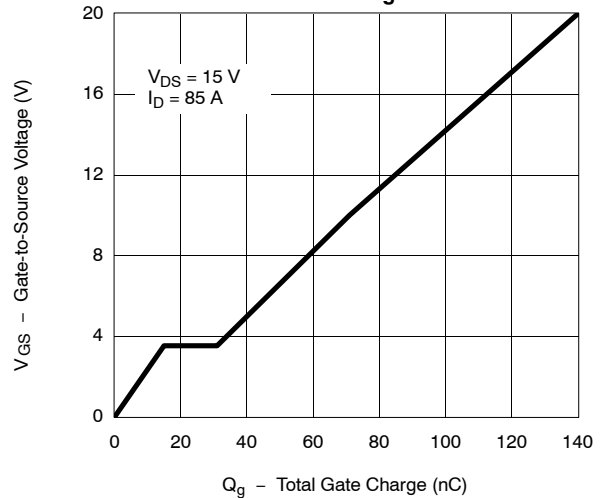
On-Resistance vs. Drain Current



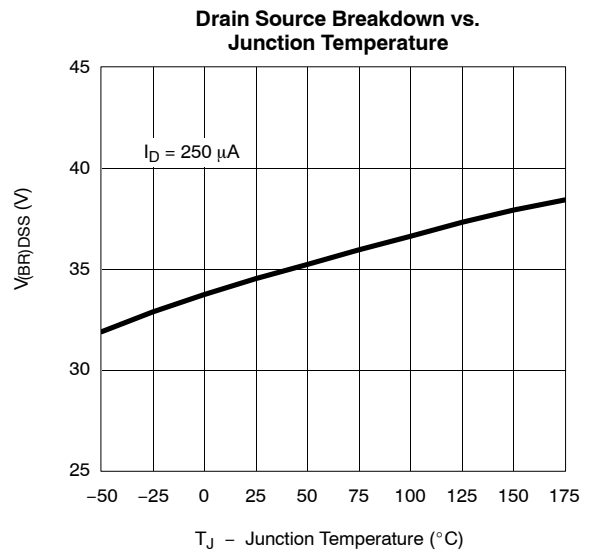
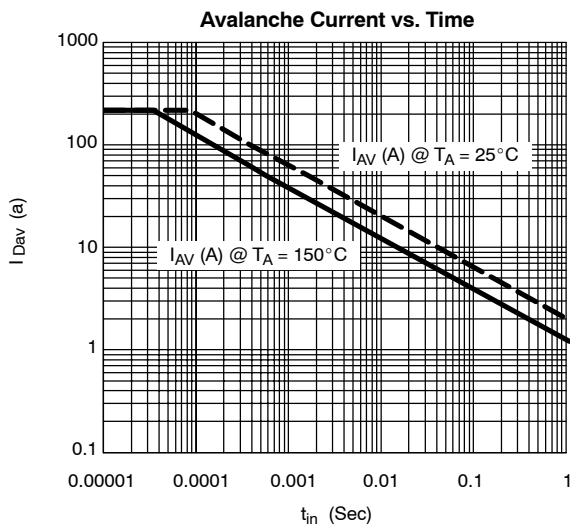
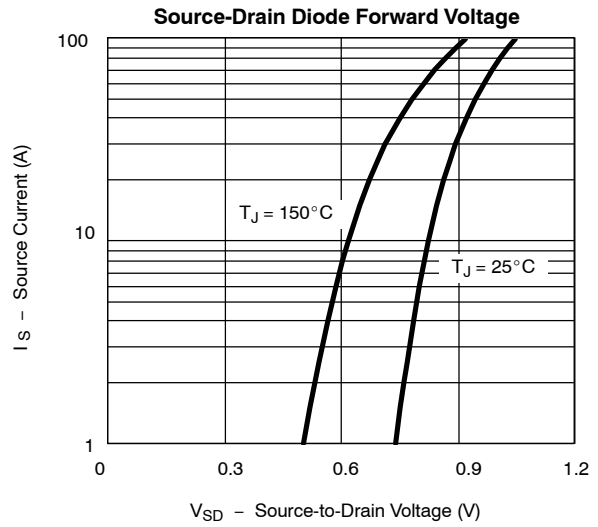
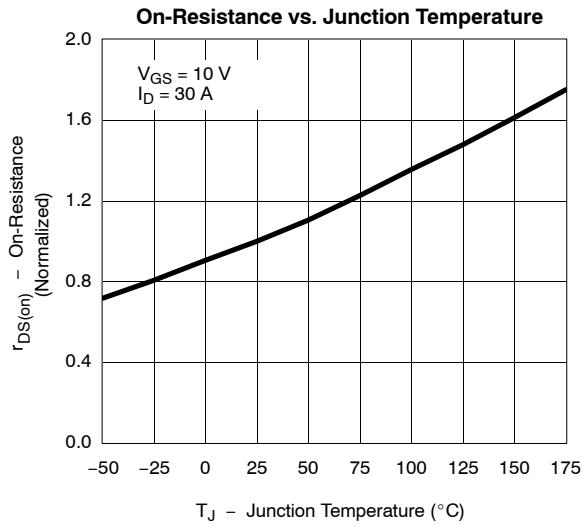
Capacitance



Gate Charge

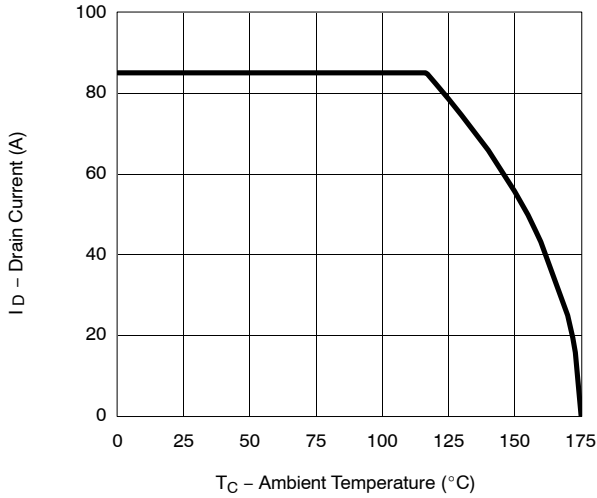


TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

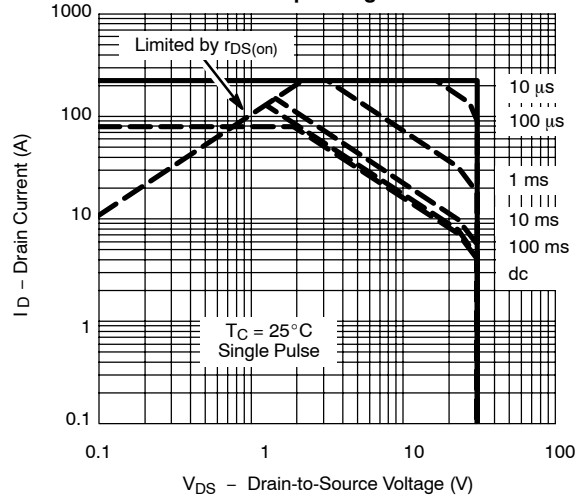


THERMAL RATINGS

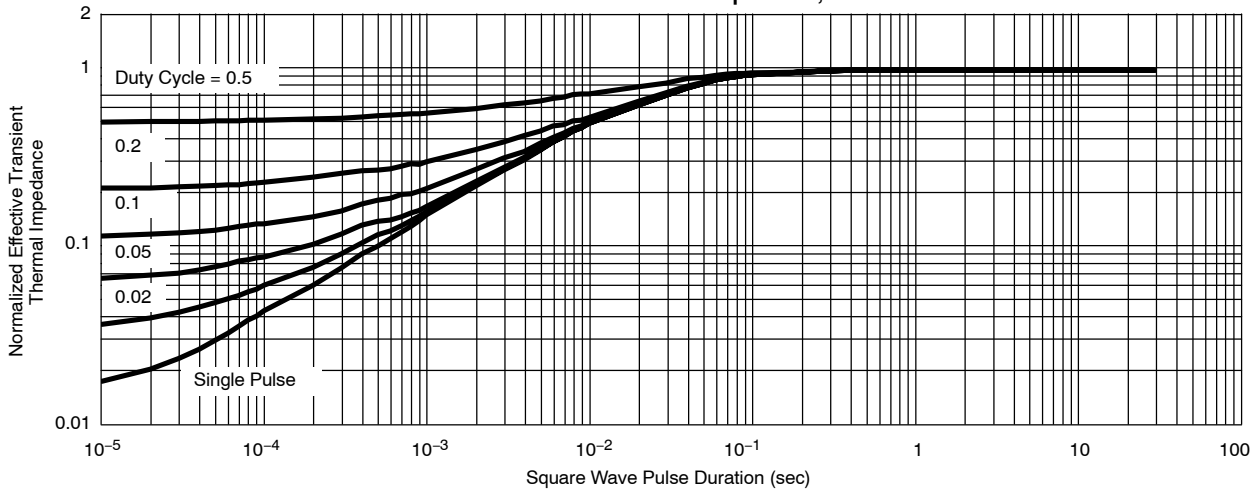
Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case





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.