

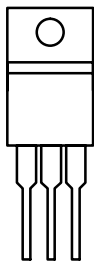


N-Channel 20-V (D-S) 175°C MOSFET

175°C Rated
Maximum Junction Temperature
TrenchFET®
Power MOSFETs

| PRODUCT SUMMARY | | |
|-------------------|---------------------------|------------------------|
| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ (Ω) | I_D (A) ^a |
| 20 | 0.003 @ $V_{GS} = 4.5$ V | 85 |
| | 0.0034 @ $V_{GS} = 2.5$ V | 85 |
| | 0.0038 @ $V_{GS} = 1.8$ V | 85 |

TO-220AB

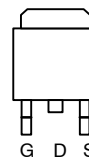


G D S
Top View

Ordering Information:
SUP85N02-03—E3 (Lead Free)

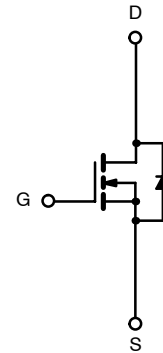
DRAIN connected to TAB

TO-263



Top View

Ordering Information:
SUB85N02-03—E3 (Lead Free)



N-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) | | | |
|---|----------------|---------------------------|------------------|
| Parameter | Symbol | Limit | Unit |
| Drain-Source Voltage | V_{DS} | 20 | V |
| Gate-Source Voltage | V_{GS} | ± 8 | |
| Continuous Drain Current ($T_J = 175^\circ\text{C}$) ^a | I_D | $T_C = 25^\circ\text{C}$ | A |
| | | $T_C = 100^\circ\text{C}$ | |
| Pulsed Drain Current | I_{DM} | 240 | A |
| Avalanche Current | I_{AR} | 30 | |
| Repetitive Avalanche Energy ^b | E_{AR} | L = 0.1 mH | mJ |
| Power Dissipation ^a | | | |
| 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) ^c | $^\circ\text{C}/\text{W}$ |
| | | Free Air (TO-220AB) | |
| Junction-to-Case | R_{thJC} | 0.6 | |

Notes:

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



| MOSFET 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 _{GS} = 0 V, I _D = 2 mA | 20 | | | V |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _{DS} = 2 mA | 0.45 | | | |
| Gate-Body Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ± 8 V | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 20 V, V _{GS} = 0 V | | | 1 | μA |
| | | V _{DS} = 20 V, V _{GS} = 0 V, T _J = 125 °C | | | 250 | |
| On-State Drain Current ^a | I _{D(on)} | V _{DS} = 5 V, V _{GS} = 4.5 V | 120 | | | A |
| Drain-Source On-State Resistance ^a | r _{DS(on)} | V _{GS} = 4.5 V, I _D = 30 A | | 0.0025 | 0.003 | Ω |
| | | V _{GS} = 4.5 V, I _D = 30 A, T _J = 125 °C | | | 0.0042 | |
| | | V _{GS} = 4.5 V, I _D = 30 A, T _J = 175 °C | | | 0.005 | |
| | | V _{GS} = 2.5 V, I _D = 30 A | | 0.0027 | 0.0034 | |
| | | V _{GS} = 1.8 V, I _D = 30 A | | 0.003 | 0.0038 | |
| Forward Transconductance ^a | g _{fs} | V _{DS} = 5 V, I _D = 30 A | 30 | | | S |
| Dynamic^b | | | | | | |
| Input Capacitance | C _{iss} | V _{GS} = 0 V, V _{DS} = 20 V, f = 1 MHz | | 21250 | | pF |
| Output Capacitance | C _{oss} | | | 2350 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 1520 | | |
| Total Gate Charge ^c | Q _g | V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 85 A | | 140 | 200 | nC |
| Gate-Source Charge ^c | Q _{gs} | | | 18 | | |
| Gate-Drain Charge ^c | Q _{gd} | | | 24 | | |
| Turn-On Delay Time ^c | t _{d(on)} | V _{DD} = 10 V, R _L = 0.12 Ω I _D = 85 A, V _{GEN} = 4.5 V, R _g = 2.5 Ω | | 20 | 30 | ns |
| Rise Time ^c | t _r | | | 200 | 300 | |
| Turn-Off Delay Time ^c | t _{d(off)} | | | 450 | 670 | |
| Fall Time ^c | t _f | | | 320 | 480 | |
| Source-Drain Diode Ratings and Characteristics (T_C = 25 °C)^b | | | | | | |
| Pulsed Current | I _{SM} | | | | 240 | A |
| Forward Voltage ^a | V _{SD} | I _F = 100 A, V _{GS} = 0 V | | 1.2 | 1.5 | V |
| Reverse Recovery Time | t _{rr} | I _F = 50 A, di/dt = 100 A/μs | | 75 | 150 | ns |

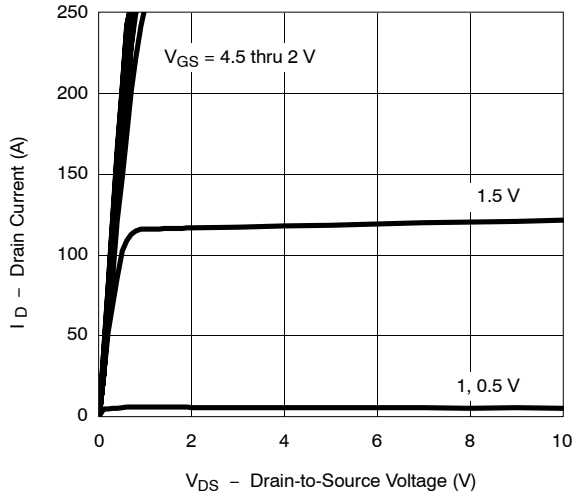
Notes:

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

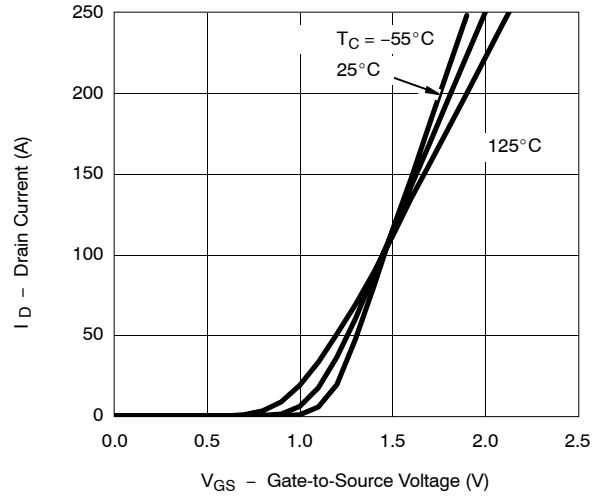


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

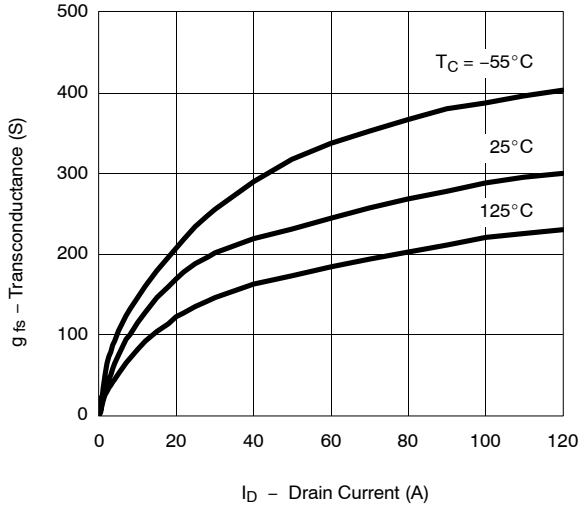
Output Characteristics



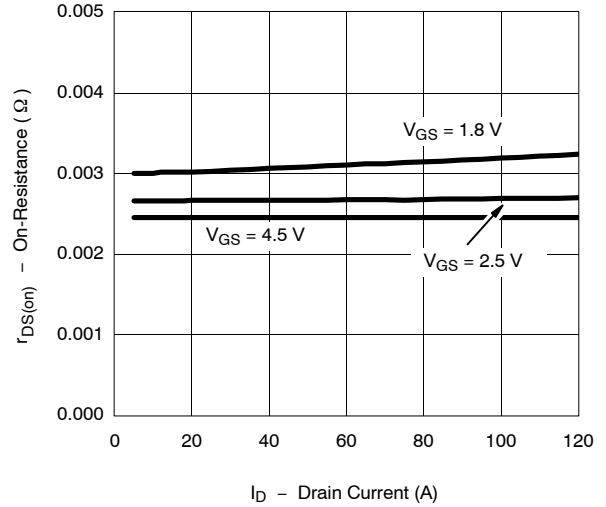
Transfer Characteristics



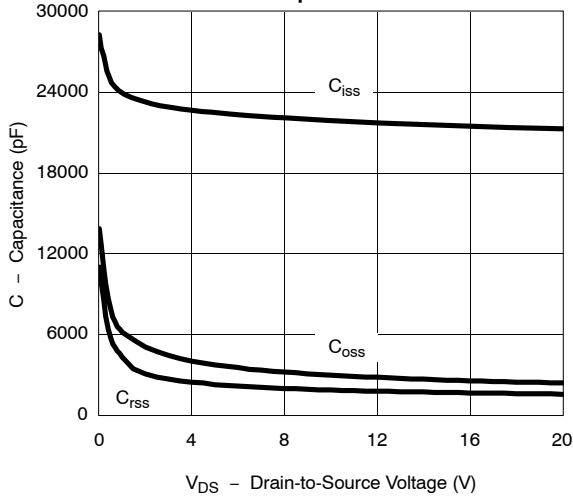
Transconductance



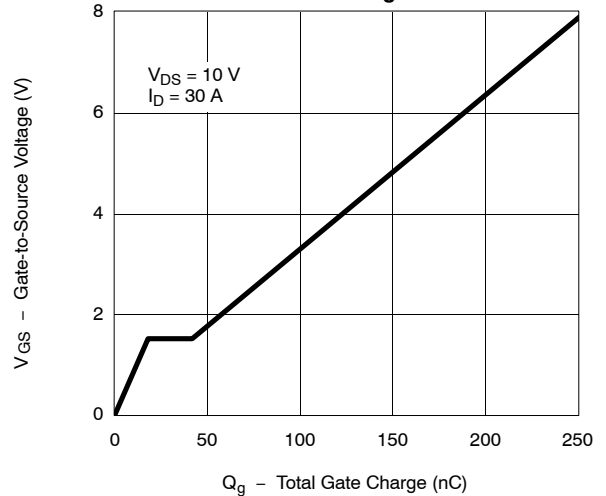
On-Resistance vs. Drain Current



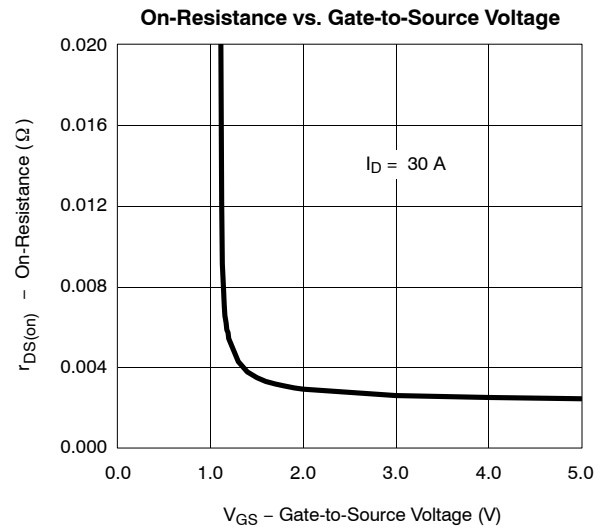
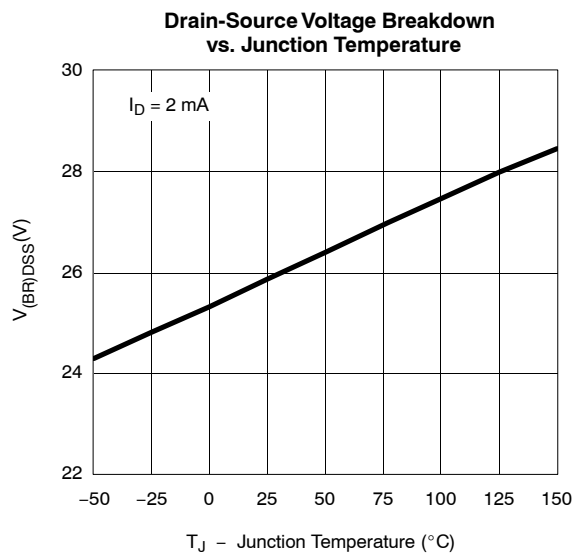
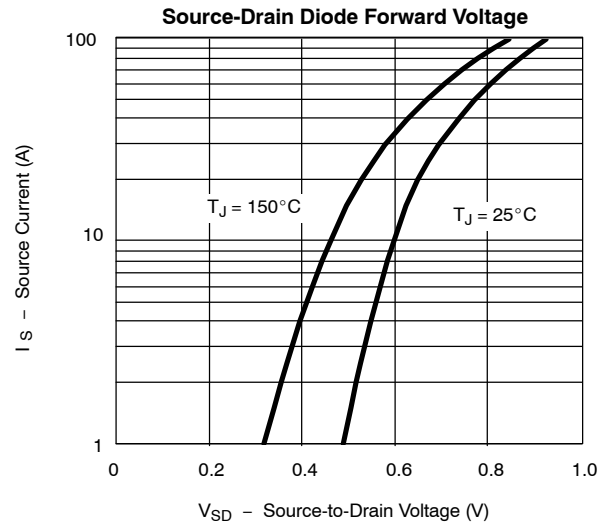
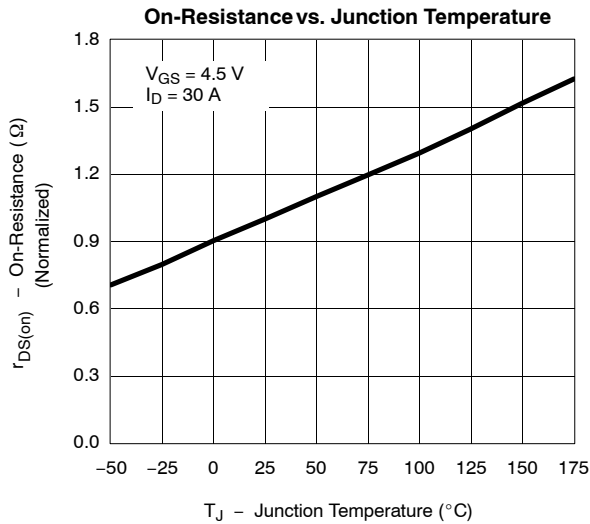
Capacitance



Gate Charge



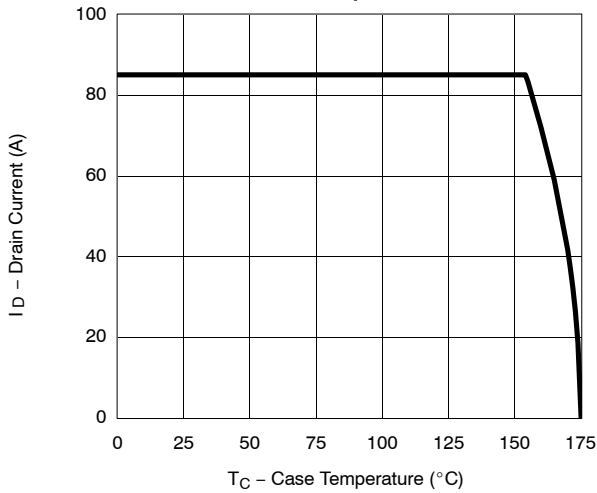
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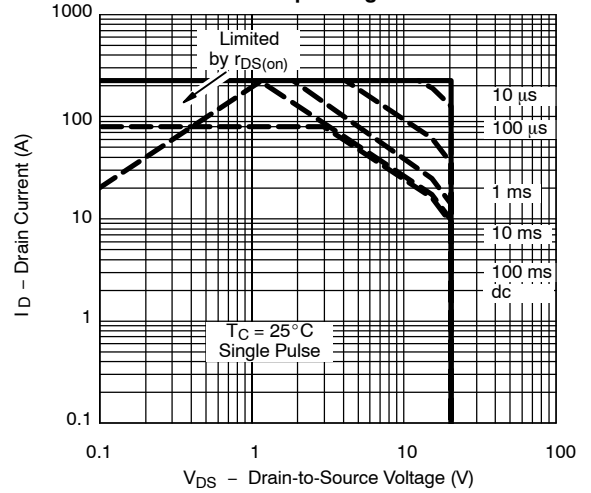


THERMAL RATINGS

Maximum Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

