

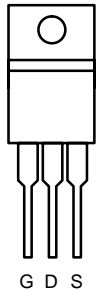


N-Channel 30-V (D-S) 175°C MOSFET

| PRODUCT SUMMARY | | |
|-------------------|---------------------------|------------------------|
| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ (Ω) | I_D (A) ^a |
| 30 | 0.007 @ $V_{GS} = 10$ V | 85 ^a |
| | 0.01 @ $V_{GS} = 4.5$ V | 75 |

175°C Rated
Maximum Junction Temperature
TrenchFET®
Power MOSFETs

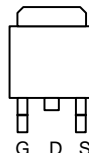
TO-220AB



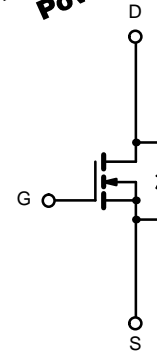
Top View
SUP85N03-07P

DRAIN connected to TAB

TO-263



Top View
SUP85N03-07P



N-Channel MOSFET

| 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 |
| | | $T_C = 100^\circ\text{C}$ | 64 |
| Pulsed Drain Current | I_{DM} | 240 | A |
| 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) | 107 ^c |
| | | $T_A = 25^\circ\text{C}$ (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 |
| | | Free Air (TO-220AB) | 62.5 |
| Junction-to-Case | R_{thJC} | 1.4 | $^\circ\text{C/W}$ |

Notes

- a. Package limited.
- b. Duty cycle $\leq 1\%$.
- c. See SOA curve for voltage derating.
- d. 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 | | |
| 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 | | 0.006 | 0.007 | Ω |
| | | V _{GS} = 10 V, I _D = 30 A, T _J = 125 °C | | | 0.011 | |
| | | V _{GS} = 10 V, I _D = 30 A, T _J = 175 °C | | | 0.015 | |
| | | V _{GS} = 4.5 V, I _D = 20 A | | | 0.01 | |
| Forward Transconductance ^a | g _{fs} | V _{DS} = 15 V, I _D = 30 A | 20 | | | S |
| Dynamic^b | | | | | | |
| Input Capacitance | C _{iss} | V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz | | 3720 | | pF |
| Output Capacitance | C _{oss} | | | 715 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 370 | | |
| Total Gate Charge ^b | Q _g | V _{DS} = 15 V, V _{GS} = 10 V, I _D = 85 A | | 60 | 120 | nC |
| Gate-Source Charge ^b | Q _{gs} | | | 13 | | |
| Gate-Drain Charge ^b | Q _{gd} | | | 10 | | |
| 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 | | 11 | 25 | ns |
| Rise Time ^b | t _r | | | 70 | 140 | |
| Turn-Off Delay Time ^b | t _{d(off)} | | | 50 | 100 | |
| Fall Time ^b | t _f | | | 105 | 200 | |
| Source-Drain Diode Ratings and Characteristics (T_C = 25 °C)^c | | | | | | |
| Continuous Current | I _S | | | | 85 | A |
| Pulsed Current | I _{SM} | | | | 200 | |
| Forward Voltage ^a | V _{SD} | I _F = 85 A, V _{GS} = 0 V | | 1.2 | 1.5 | V |
| Reverse Recovery Time | t _{rr} | I _F = 85 A, di/dt = 100 A/μs | | 55 | 100 | ns |

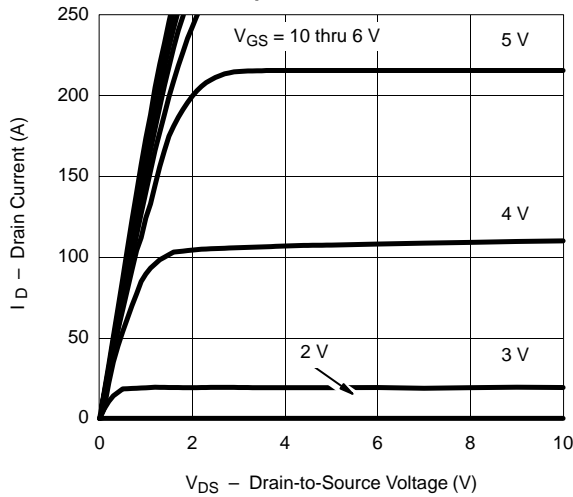
Notes

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

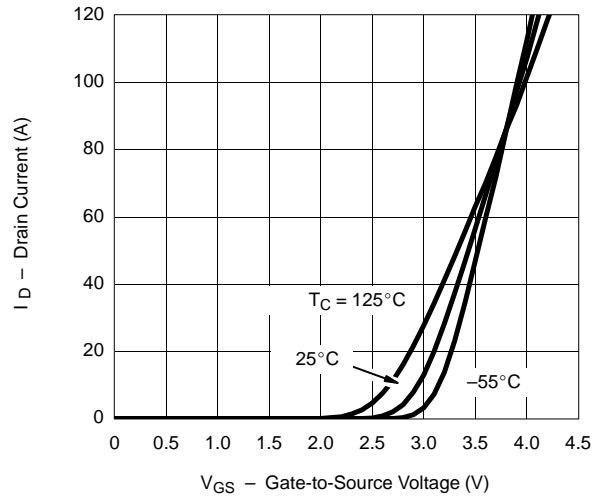


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

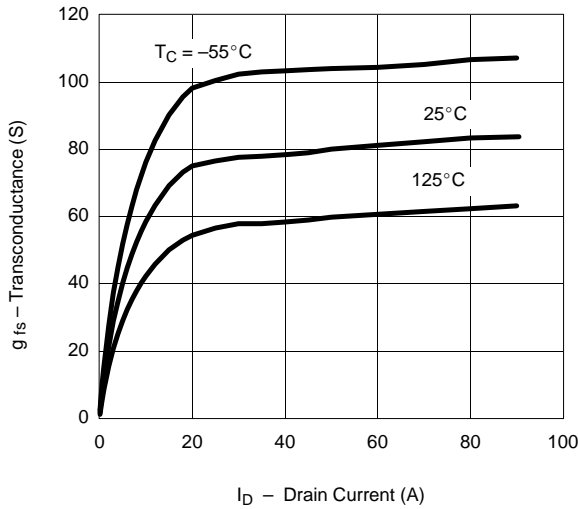
Output Characteristics



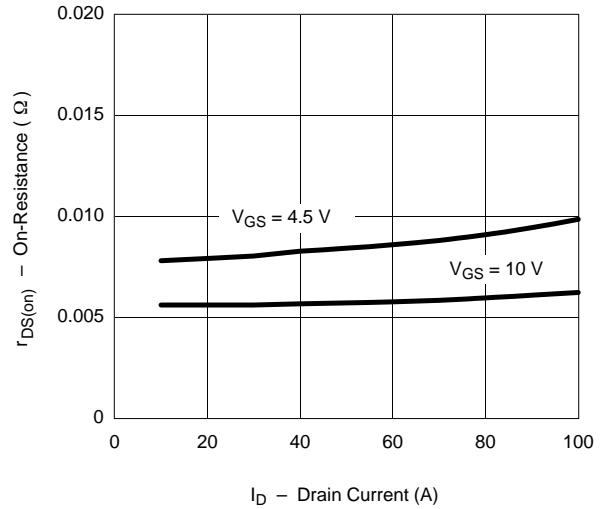
Transfer Characteristics



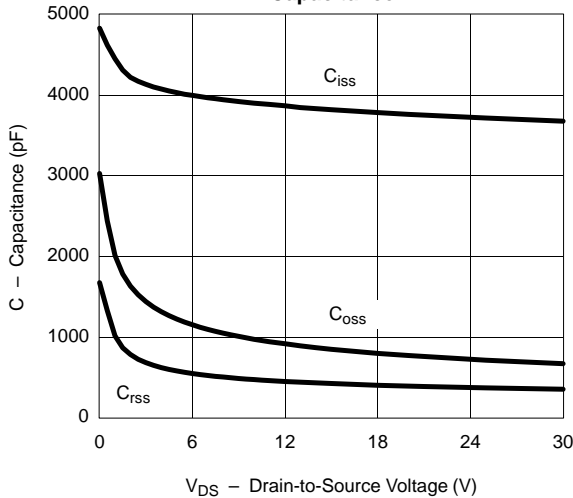
Transconductance



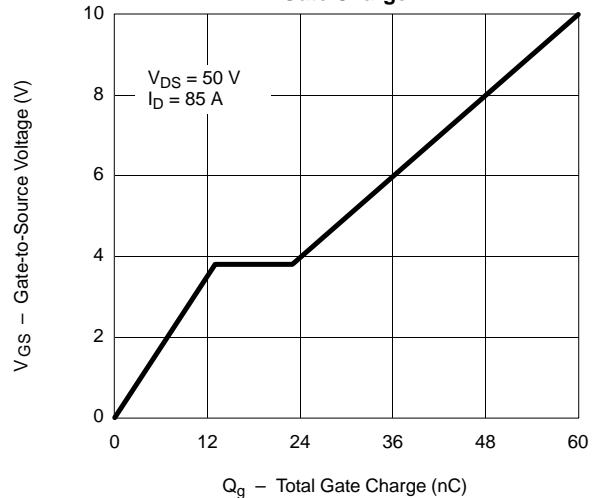
On-Resistance vs. Drain Current



Capacitance

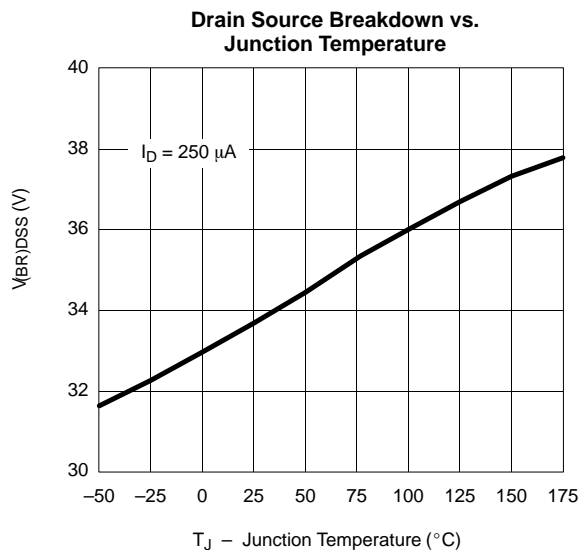
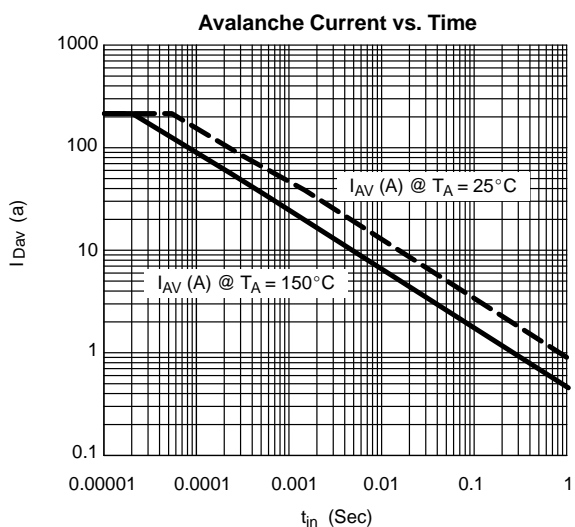
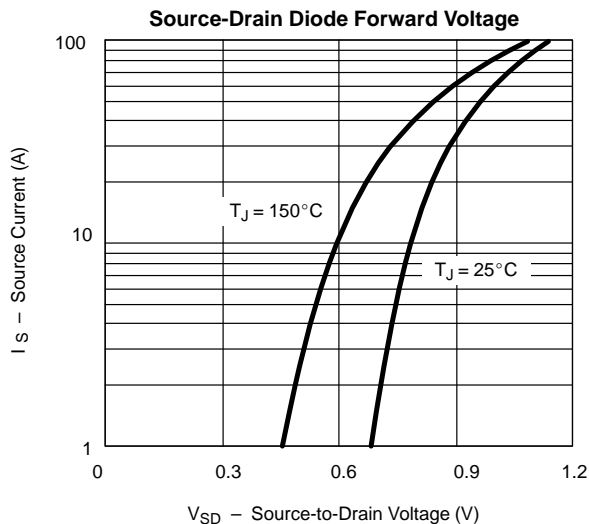
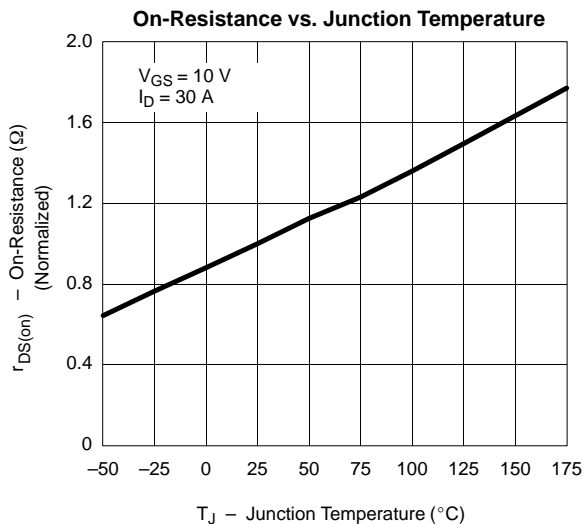


Gate Charge





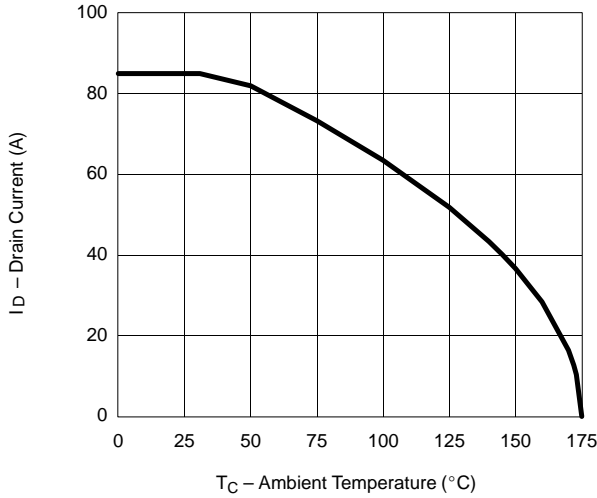
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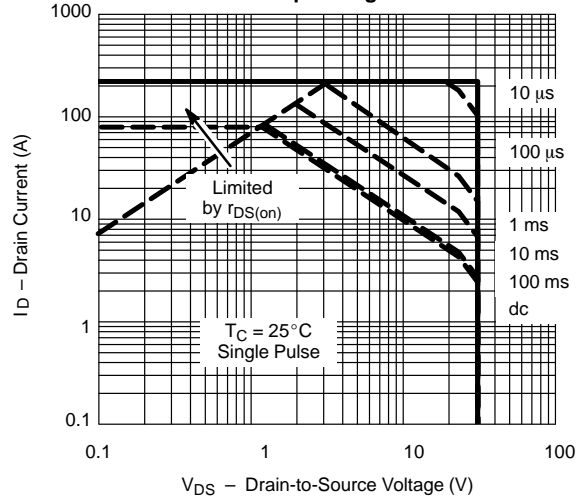


THERMAL RATINGS

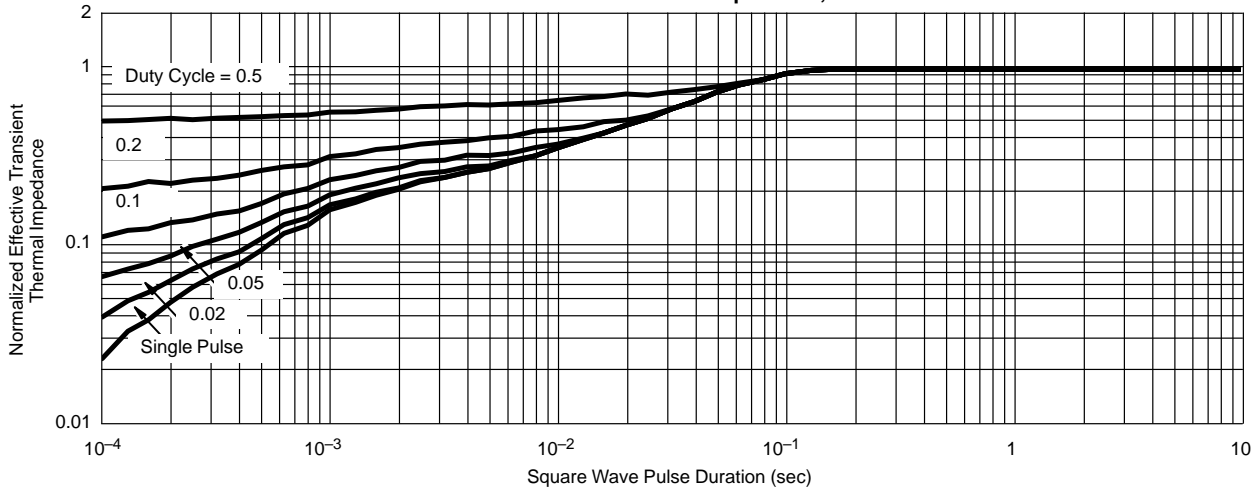
Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case





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