



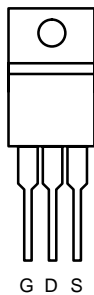
## N-Channel 75-V (D-S) 175°C MOSFET

### PRODUCT SUMMARY

|                   |                           |                 |
|-------------------|---------------------------|-----------------|
| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A)       |
| 75                | 0.008 @ $V_{GS} = 10$ V   | 85 <sup>a</sup> |

**175°C Rated**  
Maximum Junction Temperature  
**TrenchFET®**  
Power MOSFETs

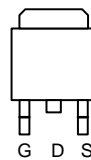
TO-220AB



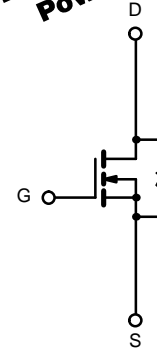
Top View  
SUP85N08-08

DRAIN connected to TAB

TO-263



Top View  
SUB85N08-08



N-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

| Parameter  | Symbol   | Limit  | Unit             |
|--|--|--|------------------|
| Drain-Source Voltage                                   | $V_{DS}$                                       | 75   | V                |
| Gate-Source Voltage                                    | $V_{GS}$                                       | $\pm 20$                                       |                  |
| Continuous Drain Current ( $T_J = 175^\circ\text{C}$ ) | $I_D$  | $T_C = 25^\circ\text{C}$                       | 85 <sup>a</sup>  |
|  |  | $T_C = 125^\circ\text{C}$                      | 67 <sup>a</sup>  |
| Pulsed Drain Current                                   | $I_{DM}$                                       | 240  | A                |
| Avalanche Current                                      | $I_{AR}$                                       | 75   |                  |
| Repetitive Avalanche Energy <sup>b</sup>               | $E_{AR}$                                       | $L = 0.1$ mH                                   |                  |
| Maximum Power Dissipation <sup>b</sup>                 |  | $T_C = 25^\circ\text{C}$ (TO-220AB and TO-263) | 250 <sup>c</sup> |
|  | $T_A = 25^\circ\text{C}$ (TO-263) <sup>d</sup> | 3.7  |                  |
| 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) <sup>d</sup> | 40                 |
|                     |            | Free Air (TO-220AB)             | 62.5               |
| Junction-to-Case    | $R_{thJC}$ | 0.6                             | $^\circ\text{C/W}$ |

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 <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)                            |                      |  |     |        |       |      |
|---|----------------------|--|-----|--------|-------|------|
| Parameter   | Symbol               | Test Condition   | Min | Typ    | Max   | Unit |
| <b>Static</b>   |                      |  |     |        |       |      |
| Drain-Source Breakdown Voltage  | V <sub>(BR)DSS</sub> | V <sub>DS</sub> = 0 V, I <sub>D</sub> = 250 μA   | 75  |        |       | V    |
| Gate-Threshold Voltage  | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA  | 2.5 |        |       |      |
| Gate-Body Leakage   | I <sub>GSS</sub>     | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V   |     |        | ±100  | nA   |
| Zero Gate Voltage Drain Current   | I <sub>DSS</sub>     | V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V  |     |        | 1     | μA   |
|   |                      | V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C   |     |        | 50    |      |
|   |                      | V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C   |     |        | 250   |      |
| On-State Drain Current <sup>a</sup>   | I <sub>D(on)</sub>   | V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 10 V  | 120 |        |       | A    |
| Drain-Source On-State Resistance <sup>a</sup>   | r <sub>DS(on)</sub>  | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A  |     | 0.0063 | 0.008 | Ω    |
|   |                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 125 °C   |     |        | 0.014 |      |
|   |                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 175 °C   |     |        | 0.018 |      |
| Forward Transconductance <sup>a</sup>   | g <sub>fs</sub>      | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A  | 30  |        |       | S    |
| <b>Dynamic<sup>b</sup></b>  |                      |  |     |        |       |      |
| Input Capacitance   | C <sub>iss</sub>     | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz   |     | 5800   |       | pF   |
| Output Capacitance  | C <sub>oss</sub>     |  |     | 900    |       |      |
| Reverse Transfer Capacitance  | C <sub>rss</sub>     |  |     | 285    |       |      |
| Total Gate Charge <sup>c</sup>  | Q <sub>g</sub>       | V <sub>DS</sub> = 35 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 85 A  |     | 100    | 150   | nC   |
| Gate-Source Charge <sup>c</sup>   | Q <sub>gs</sub>      |  |     | 35     |       |      |
| Gate-Drain Charge <sup>c</sup>  | Q <sub>gd</sub>      |  |     | 25     |       |      |
| Turn-On Delay Time <sup>c</sup>   | t <sub>d(on)</sub>   | V <sub>DD</sub> = 35 V, R <sub>L</sub> = 0.4 Ω<br>I <sub>D</sub> ≅ 85 A, V <sub>GEN</sub> = 10 V, R <sub>G</sub> = 2.5 Ω |     | 20     | 30    | ns   |
| Rise Time <sup>c</sup>  | t <sub>r</sub>       |  |     | 115    | 175   |      |
| Turn-Off Delay Time <sup>c</sup>  | t <sub>d(off)</sub>  |  |     | 50     | 75    |      |
| Fall Time <sup>c</sup>  | t <sub>f</sub>       |  |     | 80     | 120   |      |
| <b>Source-Drain Diode Ratings and Characteristics (T<sub>C</sub> = 25 °C)<sup>b</sup></b> |                      |  |     |        |       |      |
| Continuous Current  | I <sub>S</sub>       |  |     |        | 85    | A    |
| Pulsed Current  | I <sub>SM</sub>      |  |     |        | 240   |      |
| Forward Voltage <sup>a</sup>  | V <sub>SD</sub>      | I <sub>F</sub> = 85 A, V <sub>GS</sub> = 0 V   |     | 1.0    | 1.5   | V    |
| Reverse Recovery Time   | t <sub>rr</sub>      | I <sub>F</sub> = 85 A, di/dt = 100 A/μs  |     | 70     | 120   | ns   |
| Peak Reverse Recovery Current   | I <sub>RM(REC)</sub> |  |     | 4      | 7     | A    |
| Reverse Recovery Charge   | Q <sub>rr</sub>      |  |     | 0.14   | 0.30  | μC   |

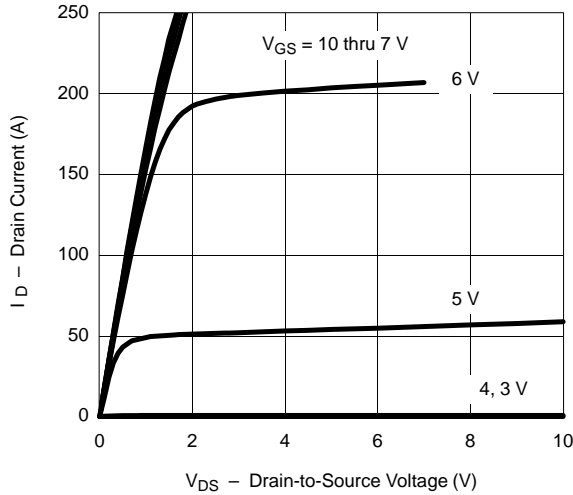
Notes

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

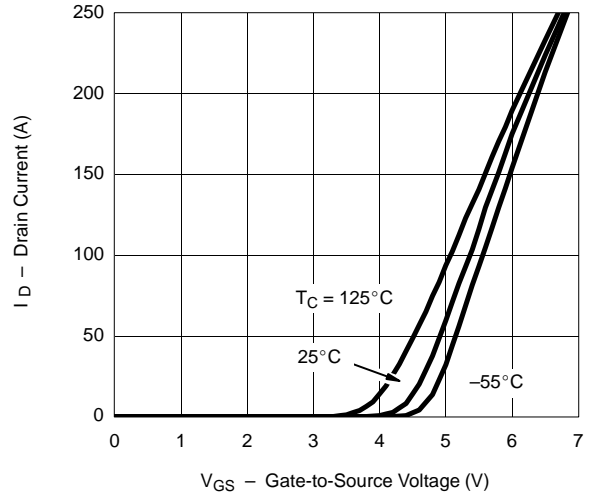


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

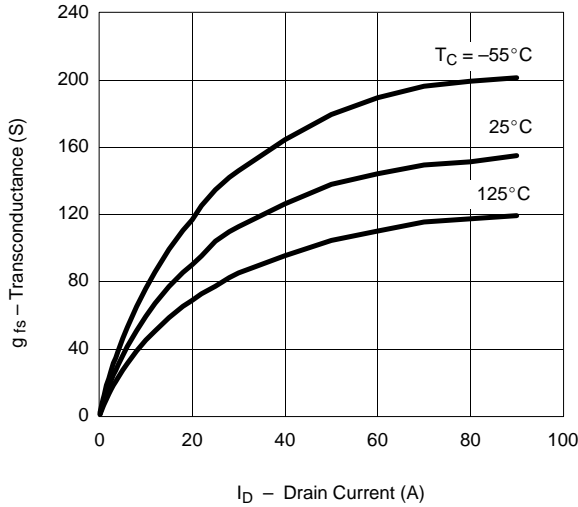
Output Characteristics



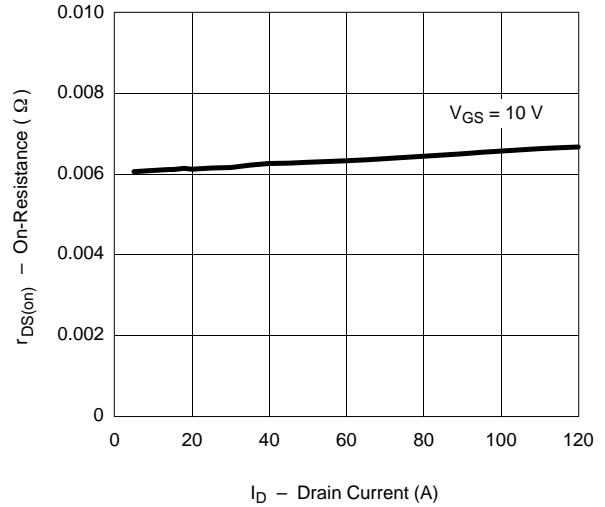
Transfer Characteristics



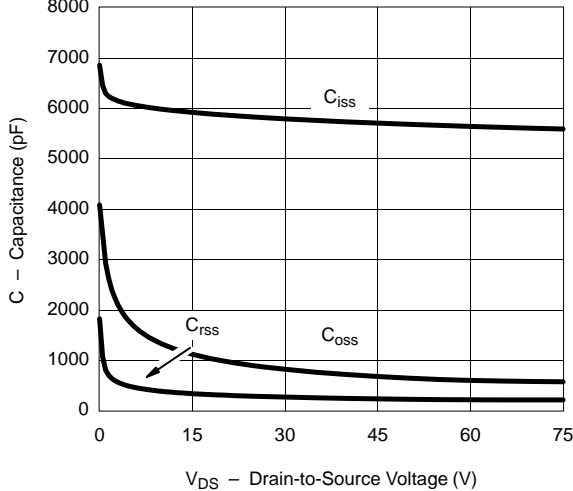
Transconductance



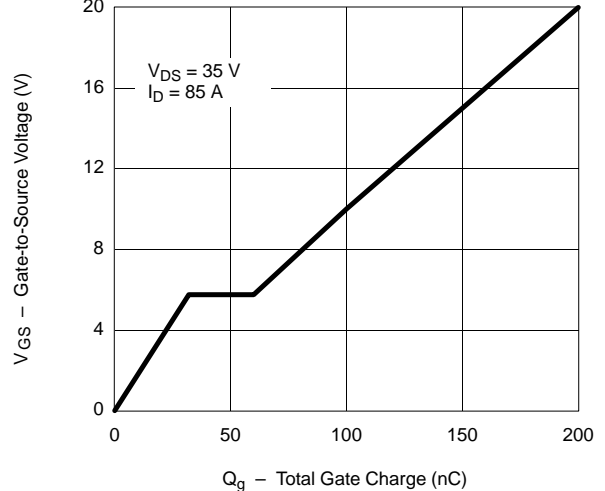
On-Resistance vs. Drain Current



Capacitance

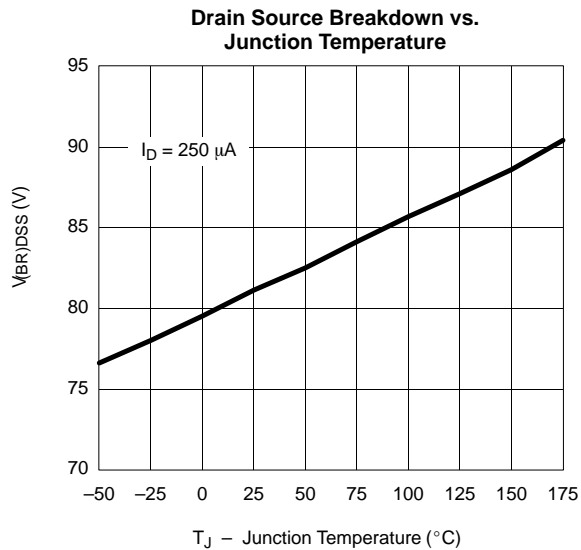
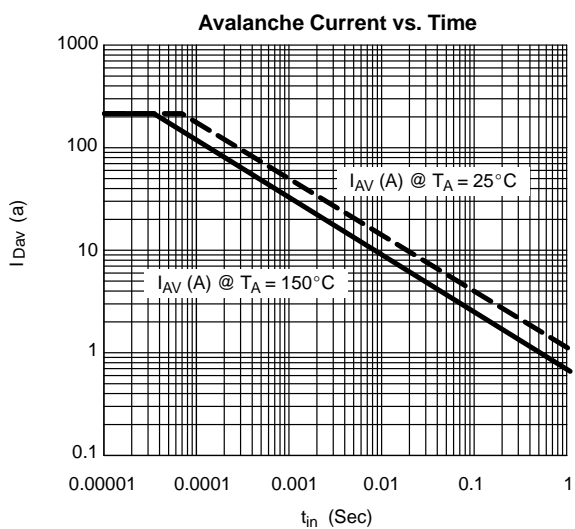
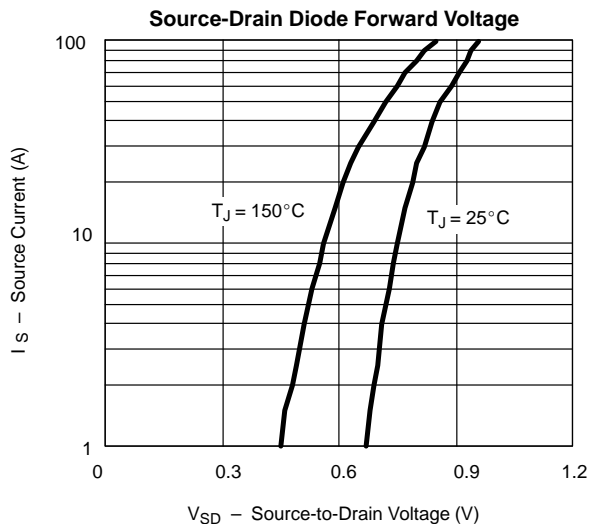
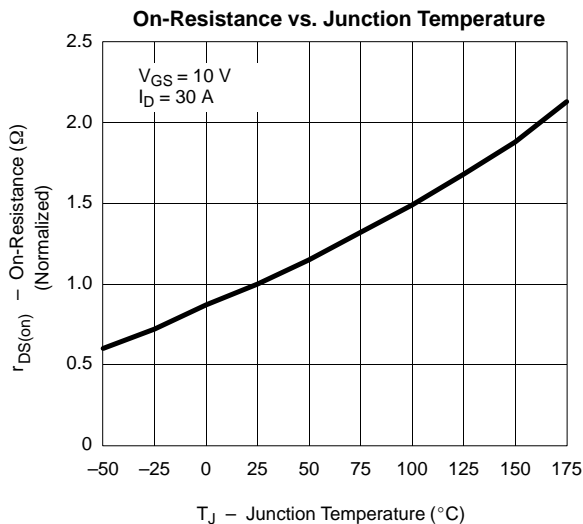


Gate Charge





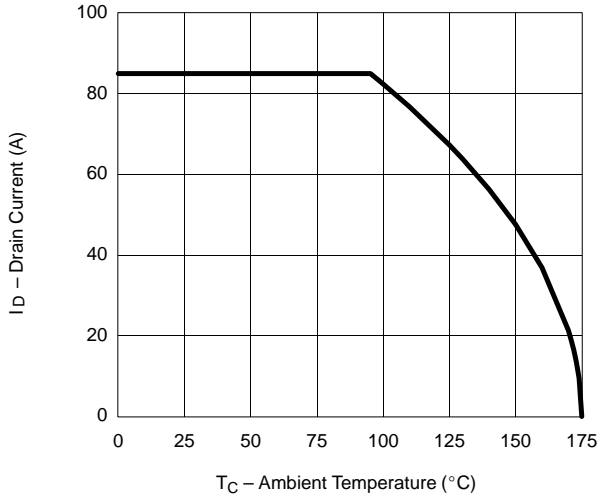
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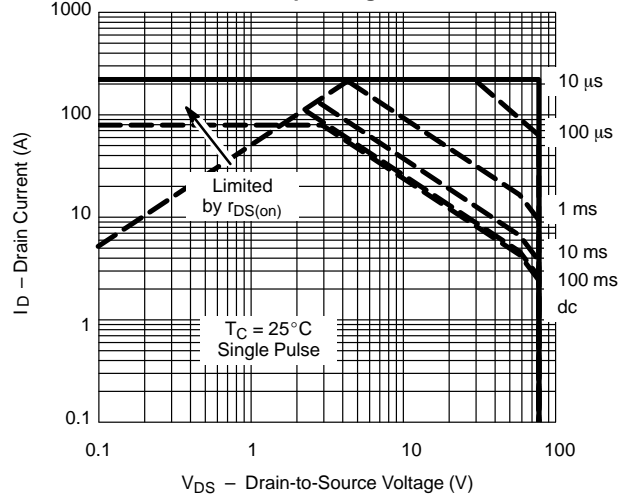


**THERMAL RATINGS**

Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

