

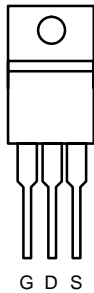


## N-Channel 50-V (D-S), 175°C MOSFET

### PRODUCT SUMMARY

| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
|-------------------|---------------------------|-----------|
| 50                | 0.006                     | 75        |

TO-220AB

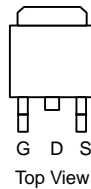


Top View

SUP75N05-06

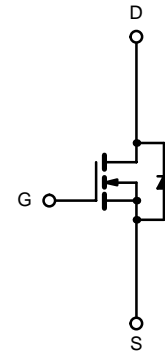
DRAIN connected to TAB

TO-263



Top View

SUB75N05-06



N-Channel MOSFET

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

| Parameter   | Symbol         | Limit  | Unit             |
|---|----------------|--|------------------|
| Gate-Source Voltage                                       | $V_{GS}$       | $\pm 20$                                       | V                |
| Continuous Drain Current<br>( $T_J = 175^\circ\text{C}$ ) | $I_D$          | $T_C = 25^\circ\text{C}$                       | 75 <sup>a</sup>  |
|   |                | $T_C = 125^\circ\text{C}$                      | 70               |
| Pulsed Drain Current                                      | $I_{DM}$       | 240  | A                |
| Avalanche Current   | $I_{AR}$       | 75   |                  |
| Repetitive Avalanche Energy <sup>b</sup>                  | $E_{AR}$       | 280  | mJ               |
| Power Dissipation   | $P_D$          | $T_C = 25^\circ\text{C}$ (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).



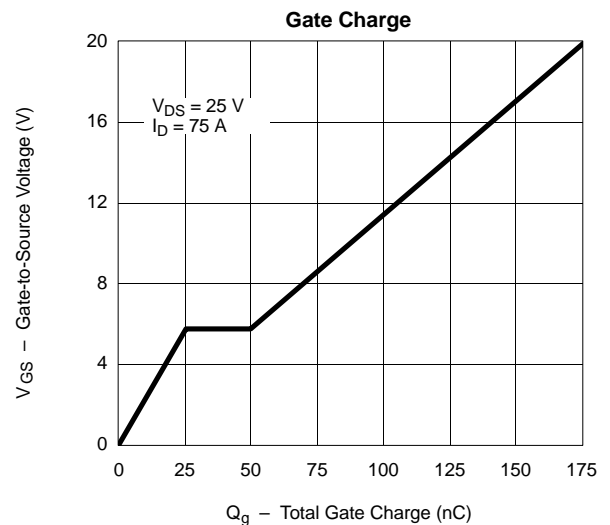
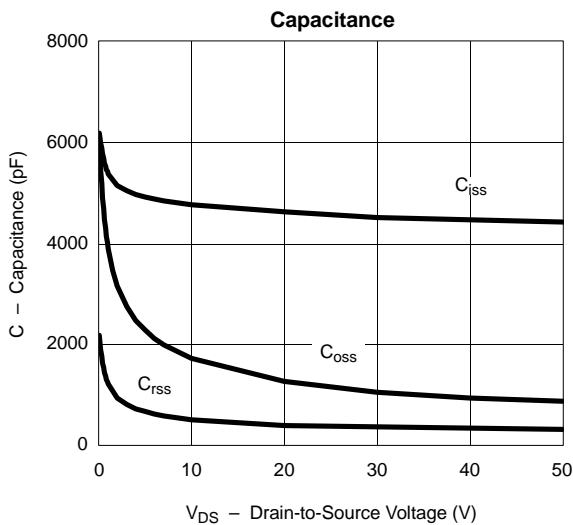
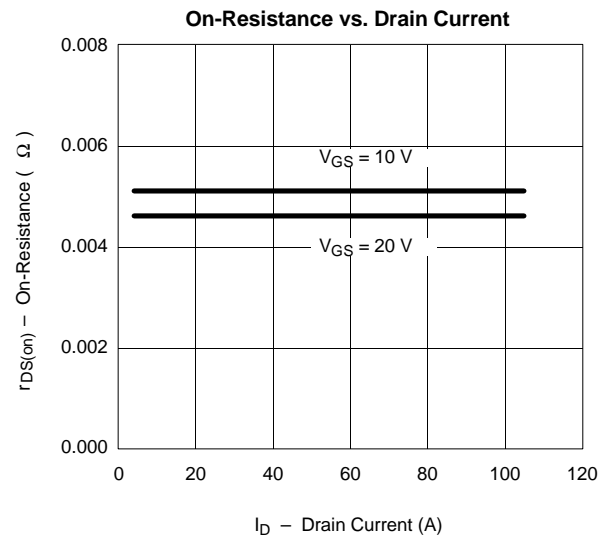
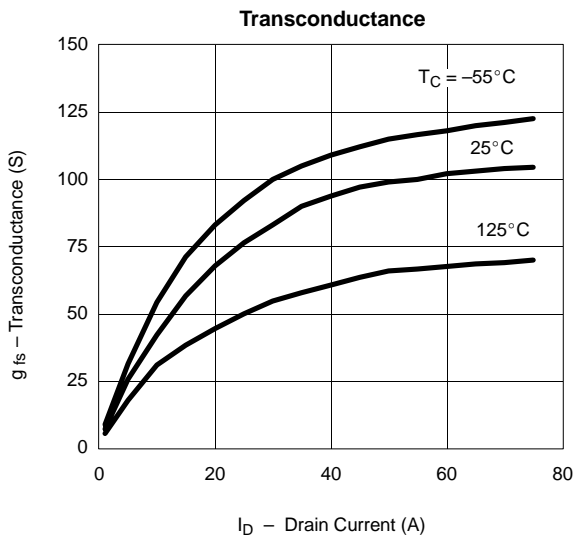
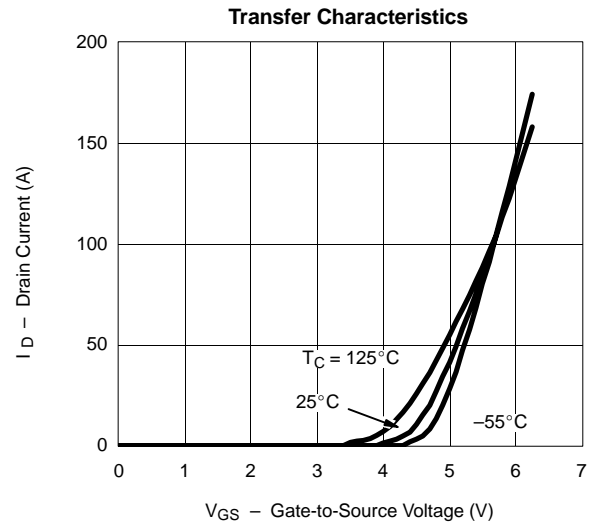
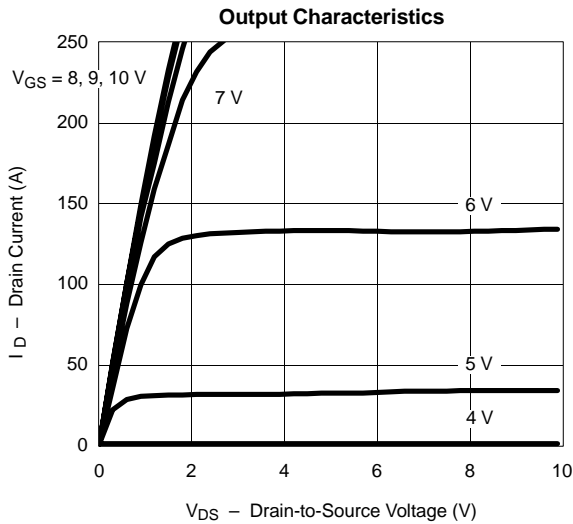
| SPECIFICATIONS (T <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)                            |                      |   |     |       |       |      |
|---|----------------------|---|-----|-------|-------|------|
| Parameter   | Symbol               | Test Condition  | Min | Typ   | Max   | Unit |
| <b>Static</b>   |                      |   |     |       |       |      |
| Drain-Source Breakdown Voltage  | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA  | 50  |       |       | V    |
| Gate Threshold Voltage  | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA   | 2.0 |       | 4.0   |      |
| 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> = 50 V, V <sub>GS</sub> = 0 V   |     |       | 1     | μA   |
|   |                      | V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C  |     |       | 50    |      |
|   |                      | V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C  |     |       | 150   |      |
| 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> = 75 A   |     | 0.005 | 0.006 | Ω    |
|   |                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 75 A, T <sub>J</sub> = 125 °C  |     |       | 0.010 |      |
|   |                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 75 A, T <sub>J</sub> = 175 °C  |     |       | 0.012 |      |
| Forward Transconductance <sup>a</sup>   | g <sub>fs</sub>      | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 60 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  |     | 4500  |       | pF   |
| Output Capacitance  | C <sub>oSS</sub>     |   |     | 1100  |       |      |
| Reverse Transfer Capacitance  | C <sub>rSS</sub>     |   |     | 360   |       |      |
| Total Gate Charge <sup>c</sup>  | Q <sub>g</sub>       | V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 75 A   |     | 85    | 120   | nC   |
| Gate-Source Charge <sup>c</sup>   | Q <sub>gs</sub>      |   |     | 25    |       |      |
| 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> = 25 V, R <sub>L</sub> = 0.33 Ω<br>I <sub>D</sub> = 75 A, V <sub>GEN</sub> = 10 V, R <sub>G</sub> = 2.5 Ω |     | 20    | 40    | ns   |
| Rise Time <sup>c</sup>  | t <sub>r</sub>       |   |     | 20    | 100   |      |
| Turn-Off Delay Time <sup>c</sup>  | t <sub>d(off)</sub>  |   |     | 50    | 100   |      |
| Fall Time <sup>c</sup>  | t <sub>f</sub>       |   |     | 20    | 40    |      |
| <b>Source-Drain Diode Ratings and Characteristics (T<sub>C</sub> = 25 °C)<sup>b</sup></b> |                      |   |     |       |       |      |
| Continuous Current  | I <sub>S</sub>       |   |     |       | 75    | A    |
| Pulsed Current  | I <sub>SM</sub>      |   |     |       | 200   |      |
| Forward Voltage <sup>a</sup>  | V <sub>SD</sub>      | I <sub>F</sub> = 75 A, V <sub>GS</sub> = 0 V  |     | 1.0   | 1.4   | V    |
| Reverse Recovery Time   | t <sub>rr</sub>      | I <sub>F</sub> = 75 A, di/dt = 100 A/μs   |     | 65    | 120   | ns   |
| Peak Reverse Recovery Current   | I <sub>RM(REC)</sub> |   |     | 5     | 8     | A    |
| Reverse Recovery Charge   | Q <sub>rr</sub>      |   |     | 0.16  | 0.48  | μC   |

Notes

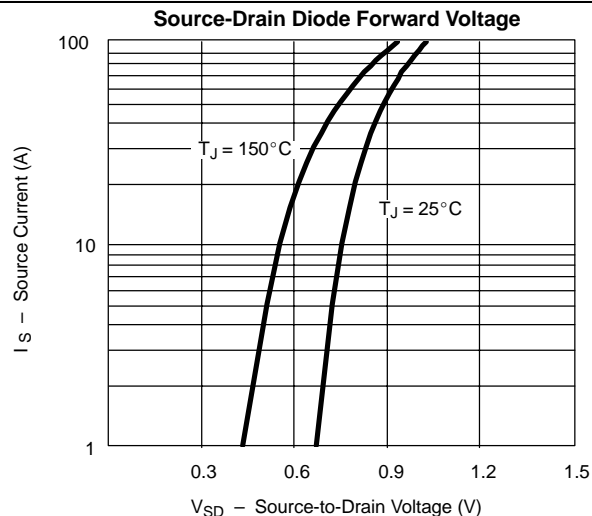
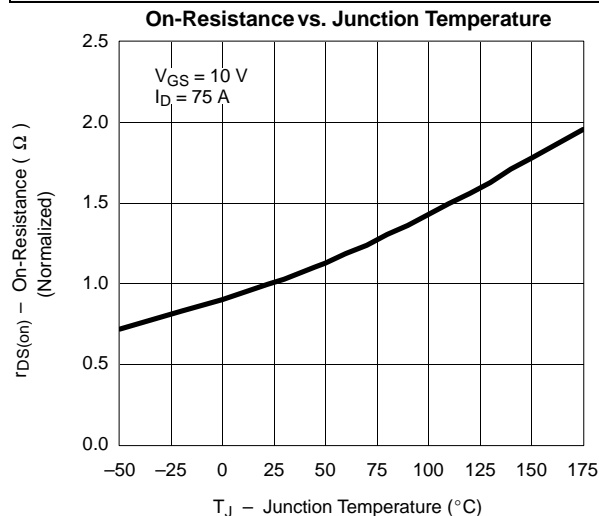
- a. Pulse test: pulse width ≤ 300 μsec, duty cycle ≤ 2%.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.



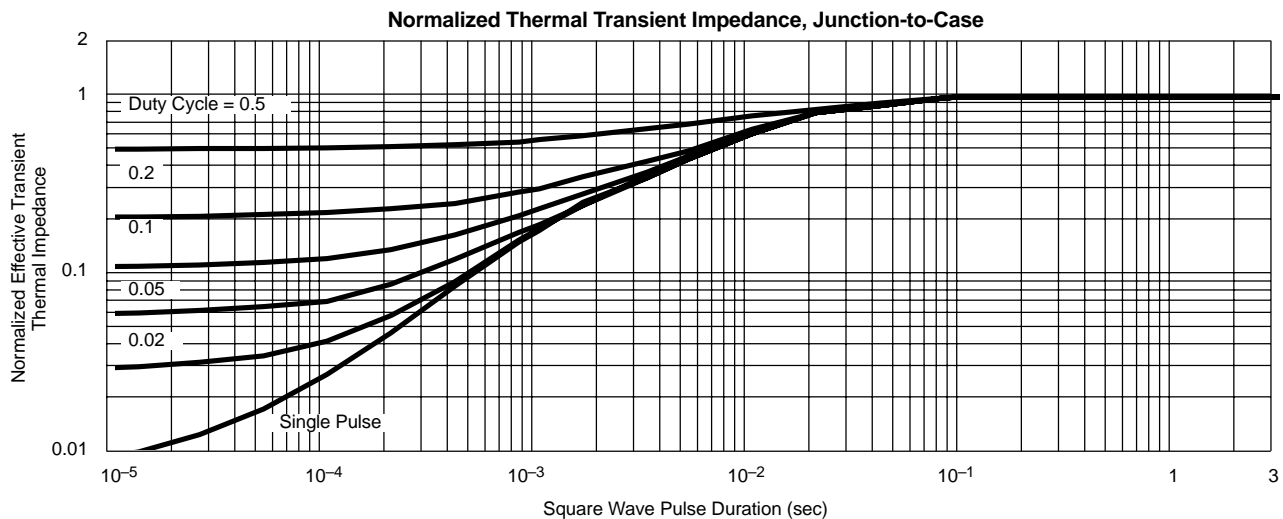
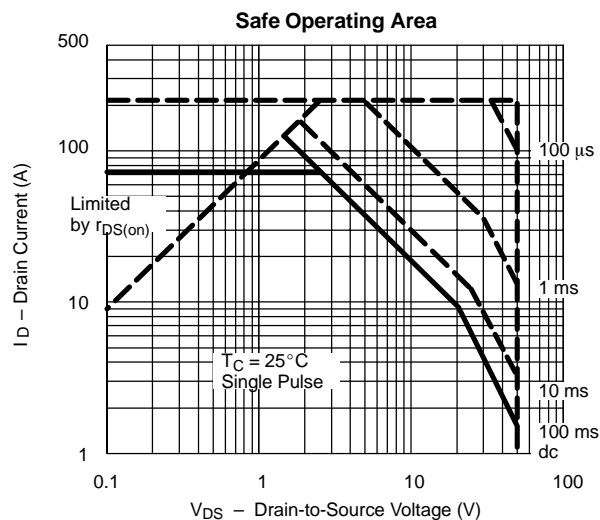
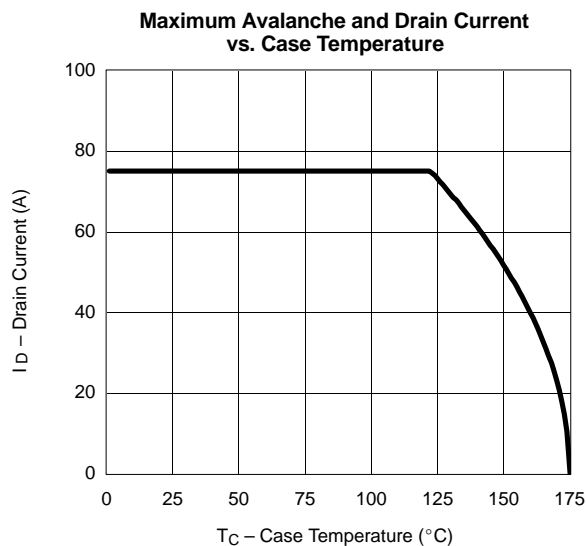
**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



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



**THERMAL RATINGS**





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