

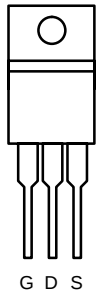


## P-Channel 30-V (D-S) 175°C MOSFET

## PRODUCT SUMMARY

| $V_{DS}$ (V) | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) <sup>a</sup> |
|--------------|---------------------------|------------------------|
| -30          | 0.007 @ $V_{GS} = -10$ V  | $\pm 75$               |
|              | 0.010 @ $V_{GS} = -4.5$ V | $\pm 75$               |

TO-220AB

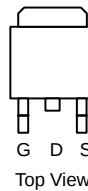


Top View

SUP75P03-07

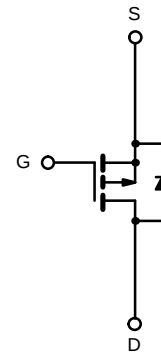
DRAIN connected to TAB

TO-263



Top View

SUB75P03-07



P-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>( $T_J = 175^\circ\text{C}$ ) | $T_C = 25^\circ\text{C}$                       | $I_D$          | -75 <sup>a</sup> | A                |
|                                                           | $T_C = 125^\circ\text{C}$                      |                | -65              |                  |
| Pulsed Drain Current                                      |                                                | $I_{DM}$       | -240             |                  |
| Avalanche Current                                         |                                                | $I_{AR}$       | -60              |                  |
| Repetitive Avalanche Energy <sup>b</sup>                  | $L = 0.1$ mH                                   | $E_{AR}$       | 180              | mJ               |
| Power Dissipation                                         | $T_C = 25^\circ\text{C}$ (TO-220AB and TO-263) | $P_D$          | 187 <sup>d</sup> | W                |
|                                                           | $T_A = 25^\circ\text{C}$ (TO-263) <sup>c</sup> |                | 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 | PCB Mount (TO-263) <sup>c</sup> | $R_{thJA}$ | 40    | $^\circ\text{C/W}$ |
|                     | Free Air (TO-220AB)             | $R_{thJA}$ | 62.5  |                    |
| Junction-to-Case    |                                 | $R_{thJC}$ | 0.8   |                    |

## Notes:

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

**SPECIFICATIONS ( $T_J = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**

| Parameter                                                                           | Symbol               | Test Condition                                                                                                              | Min  | Typ    | Max   | Unit |
|-------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------|------|--------|-------|------|
| Static                                                                              |                      |                                                                                                                             |      |        |       |      |
| Drain-Source Breakdown Voltage                                                      | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0 V, I <sub>D</sub> = −250 μA                                                                             | −30  |        |       | V    |
| Gate Threshold Voltage                                                              | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = −250 μA                                                                | −1   |        | −3    |      |
| 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> = −30 V, V <sub>GS</sub> = 0 V                                                                              |      |        | −1    | μA   |
|                                                                                     |                      | V <sub>DS</sub> = −30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125°C                                                      |      |        | −50   |      |
|                                                                                     |                      | V <sub>DS</sub> = −30 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                                                                             |      | 0.0055 | 0.007 | Ω    |
|                                                                                     |                      | V <sub>GS</sub> = −10 V, I <sub>D</sub> = −30 A, T <sub>J</sub> = 125°C                                                     |      |        | 0.010 |      |
|                                                                                     |                      | V <sub>GS</sub> = −10 V, I <sub>D</sub> = −30 A, T <sub>J</sub> = 175°C                                                     |      |        | 0.013 |      |
|                                                                                     |                      | V <sub>GS</sub> = −4.5 V, I <sub>D</sub> = −20 A                                                                            |      | 0.008  | 0.010 | Ω    |
| Forward Transconductance <sup>a</sup>                                               | g <sub>fs</sub>      | V <sub>DS</sub> = −15 V, I <sub>D</sub> = −75 A                                                                             | 20   |        |       | S    |
| Dynamic <sup>b</sup>                                                                |                      |                                                                                                                             |      |        |       |      |
| Input Capacitance                                                                   | C <sub>iss</sub>     | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = −25 V, f = 1 MHz                                                                   |      | 9000   |       | pF   |
| Output Capacitance                                                                  | C <sub>oss</sub>     |                                                                                                                             |      | 1565   |       |      |
| Reverse Transfer Capacitance                                                        | C <sub>rss</sub>     |                                                                                                                             |      | 715    |       |      |
| Total Gate Charge <sup>c</sup>                                                      | Q <sub>g</sub>       | V <sub>DS</sub> = −15 V, V <sub>GS</sub> = −10 V, I <sub>D</sub> = −75 A                                                    |      | 160    | 240   | nC   |
| Gate-Source Charge <sup>c</sup>                                                     | Q <sub>gs</sub>      |                                                                                                                             |      | 32     |       |      |
| Gate-Drain Charge <sup>c</sup>                                                      | Q <sub>gd</sub>      |                                                                                                                             |      | 30     |       |      |
| Turn-On Delay Time <sup>c</sup>                                                     | t <sub>d(on)</sub>   | V <sub>DD</sub> = −15 V, R <sub>L</sub> = 0.2 Ω<br>I <sub>D</sub> ≈ −75 A, V <sub>GEN</sub> = −10 V, R <sub>G</sub> = 2.5 Ω |      | 25     | 40    | ns   |
| Rise Time <sup>c</sup>                                                              | t <sub>r</sub>       |                                                                                                                             |      | 225    | 360   |      |
| Turn-Off Delay Time <sup>c</sup>                                                    | t <sub>d(off)</sub>  |                                                                                                                             |      | 150    | 240   |      |
| Fall Time <sup>c</sup>                                                              | t <sub>f</sub>       |                                                                                                                             |      | 210    | 340   |      |
| Source-Drain Diode Ratings and Characteristics (T <sub>C</sub> = 25°C) <sup>b</sup> |                      |                                                                                                                             |      |        |       |      |
| Continuous Current                                                                  | I <sub>S</sub>       |                                                                                                                             |      |        | −75   | A    |
| Pulsed Current                                                                      | I <sub>SM</sub>      |                                                                                                                             |      |        | −240  |      |
| Forward Voltage <sup>a</sup>                                                        | V <sub>SD</sub>      | I <sub>F</sub> = −75 A, V <sub>GS</sub> = 0 V                                                                               |      | −1.2   | −1.5  | V    |
| Reverse Recovery Time                                                               | t <sub>rr</sub>      | I <sub>F</sub> = −75 A, di/dt = 100 A/μs                                                                                    |      | 55     | 100   | ns   |
| Peak Reverse Recovery Current                                                       | I <sub>RM(REC)</sub> |                                                                                                                             |      | 2.5    | 5     | A    |
| Reverse Recovery Charge                                                             | Q <sub>rr</sub>      |                                                                                                                             |      | 0.07   | 0.25  | μC   |

## Notes:

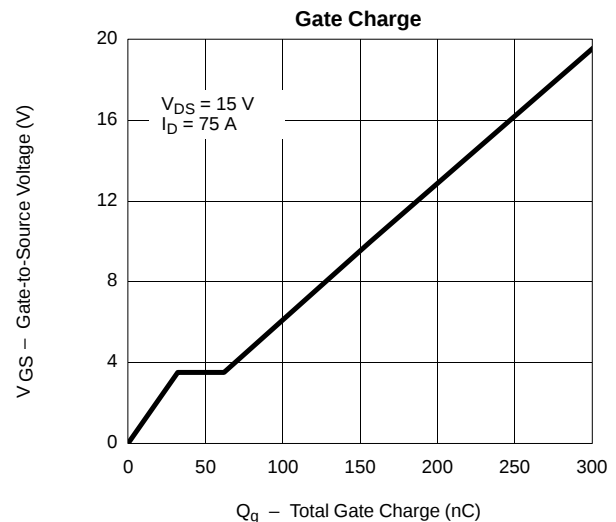
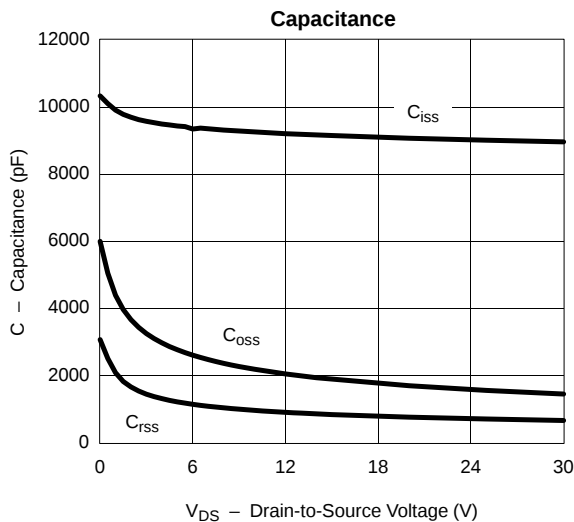
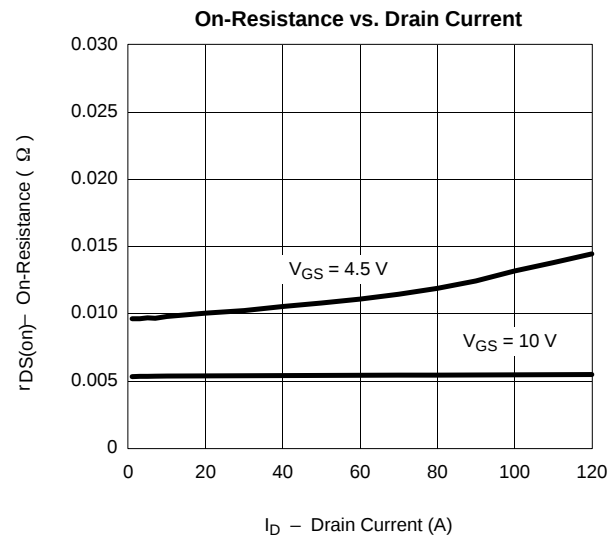
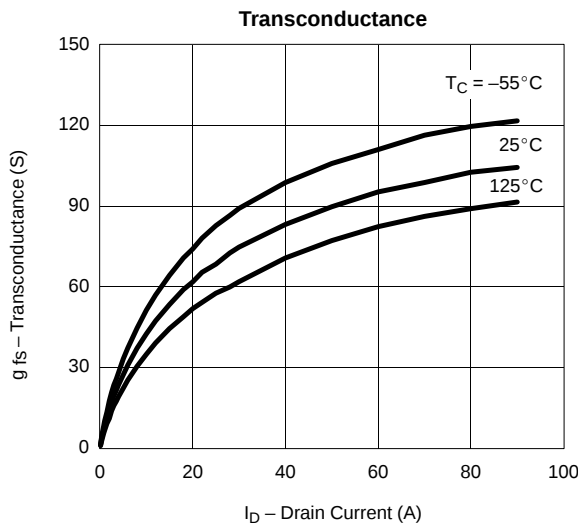
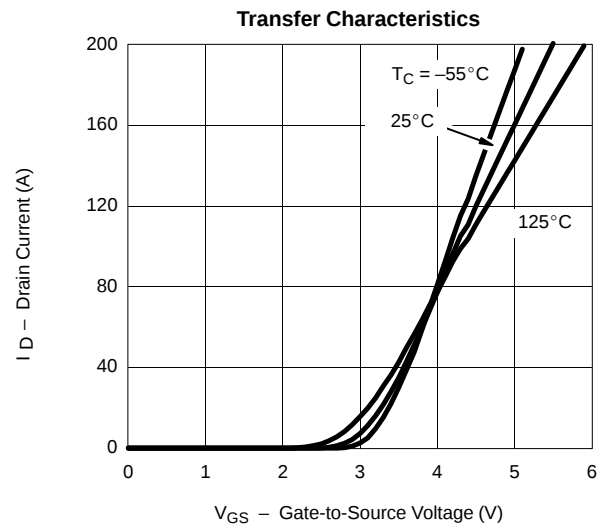
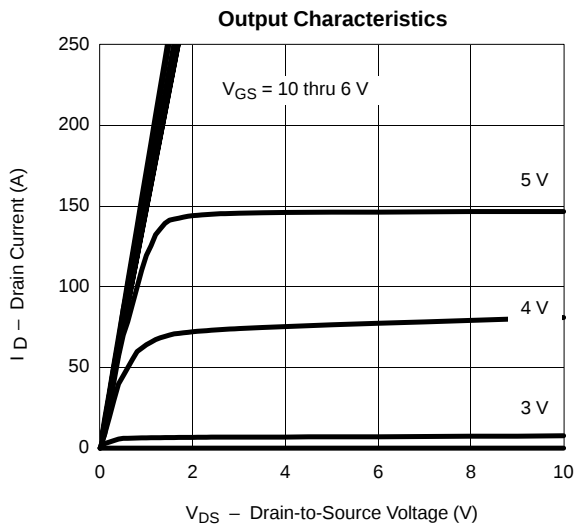
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

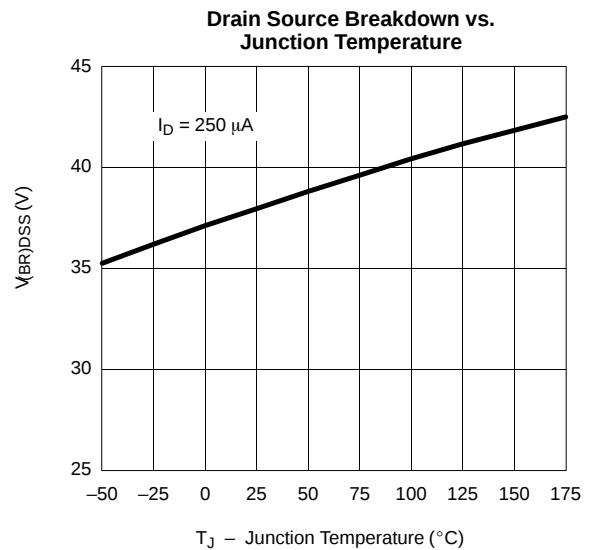
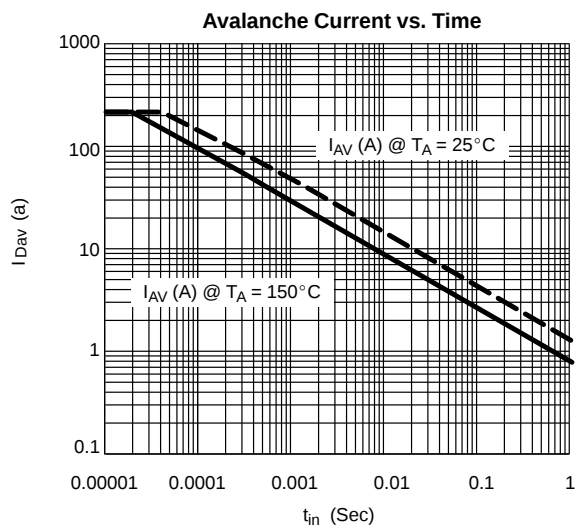
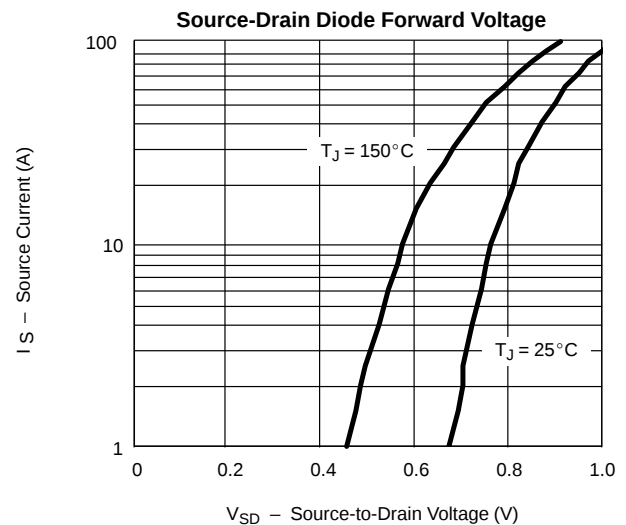
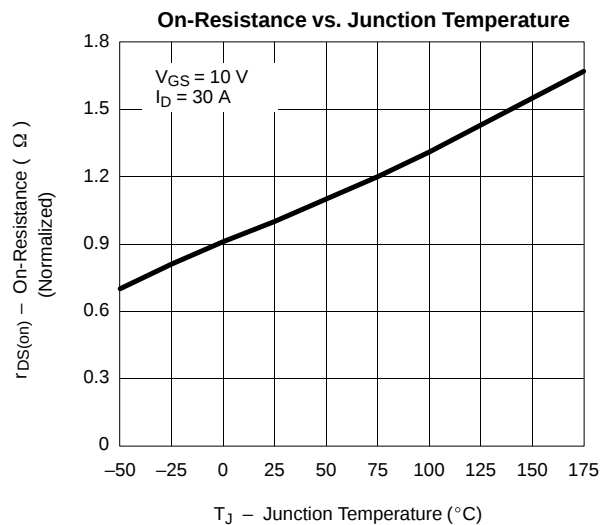
c. Independent of operating temperature.

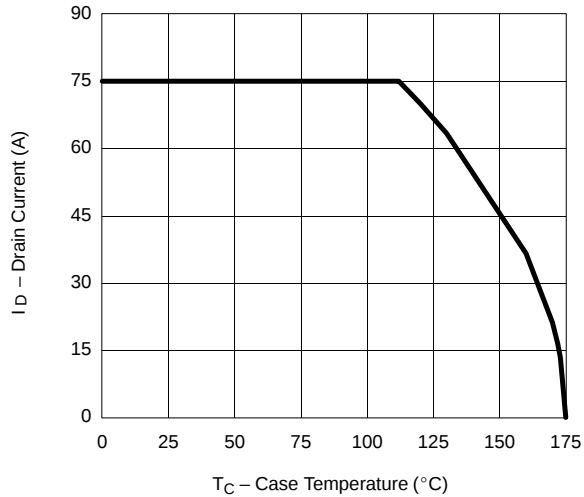
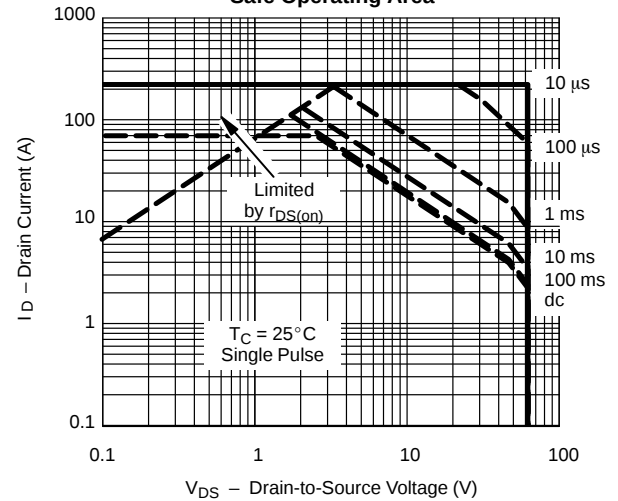


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)



**THERMAL RATINGS****Maximum Avalanche and Drain Current  
vs. Case Temperature****Safe Operating Area****Normalized Thermal Transient Impedance, Junction-to-Case**