

## N-Channel Enhancement-Mode Transistor, 18-mΩ $r_{DS(on)}$

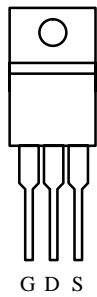
### Product Summary

| $V_{DS}$ (V) | $r_{DS(on)}$ (Ω) | $I_D$ (A) |
|--------------|------------------|-----------|
| 60           | 0.018            | 60        |

**175°C Rated**  
Maximum Junction Temperature

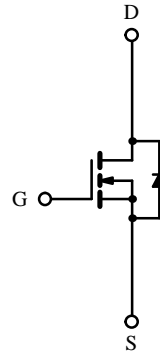
See lower-cost version: SUP50N06-18

TO-220AB



Top View

DRAIN connected to TAB



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                         | $I_D$                           | $T_C = 25^\circ\text{C}$  | 60               |
|  |                                 | $T_C = 100^\circ\text{C}$ | 41               |
| Pulsed Drain Current                             | $I_{DM}$                        | 240                       | A                |
| Avalanche Current                                | $I_{AR}$                        | 60                        |                  |
| Avalanche Energy                                 | $L = 0.1\text{ mH}$<br>$I_{AR}$ | 180                       | mJ               |
| Repetitive Avalanche Energy <sup>a</sup>         | $L = 0.1\text{ mH}$<br>$E_{AR}$ | 90                        |                  |
| Power Dissipation                                | $P_D$                           | $T_C = 25^\circ\text{C}$  | 125              |
|  |                                 | $T_C = 100^\circ\text{C}$ | 62               |
| Operating Junction and Storage Temperature Range | $T_J, T_{stg}$                  | -55 to 175                | $^\circ\text{C}$ |
| Lead Temperature (1/16" from case for 10 sec.)   | $T_L$                           | 300                       |                  |

### Thermal Resistance Ratings

| Parameter           | Symbol     | Typical | Maximum | Unit               |
|---------------------|------------|---------|---------|--------------------|
| Junction-to-Ambient | $R_{thJA}$ |         | 80      | $^\circ\text{C/W}$ |
| Junction-to-Case    | $R_{thJC}$ |         | 1.2     |                    |
| Case-to-Sink        | $R_{thCS}$ | 1.0     |         |                    |

Notes:

a. Duty cycle  $\leq 1\%$

Subsequent updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #1437. A SPICE Model data sheet is available for this product (FaxBack document #5118).

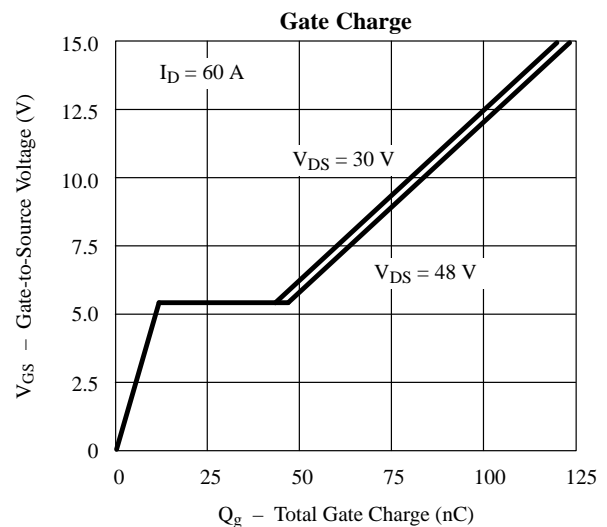
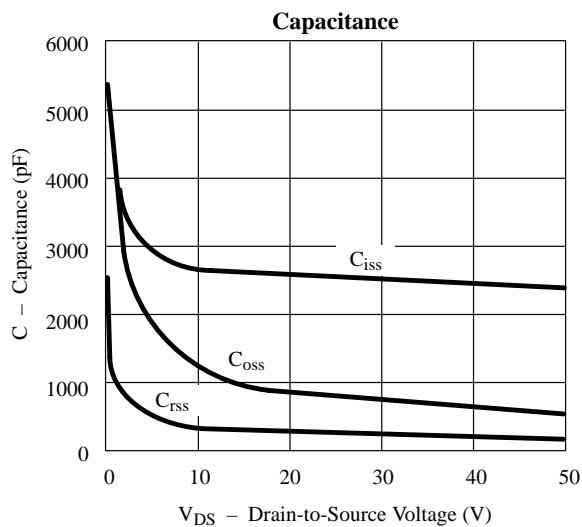
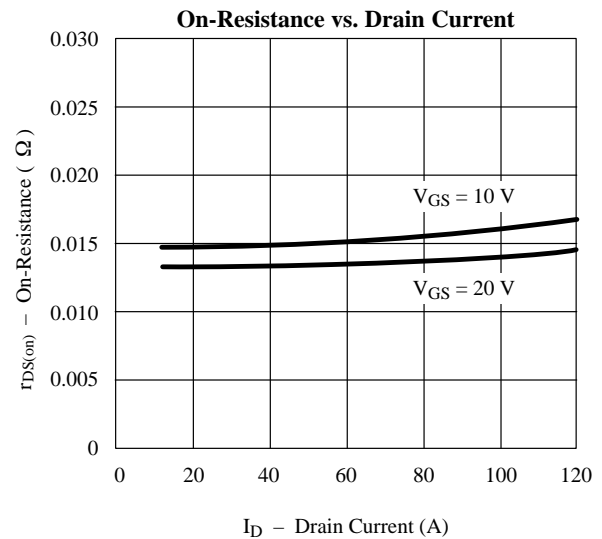
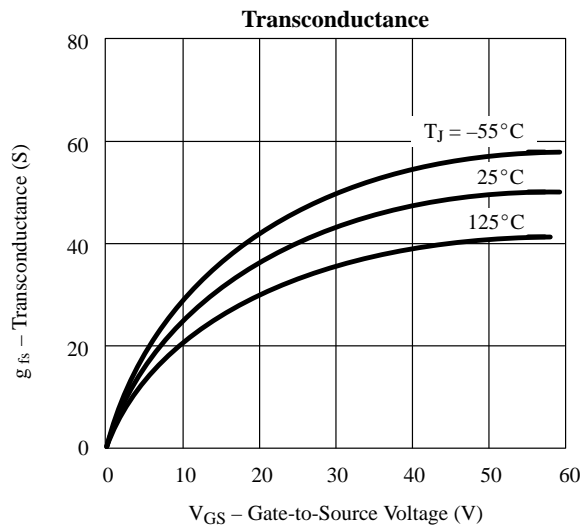
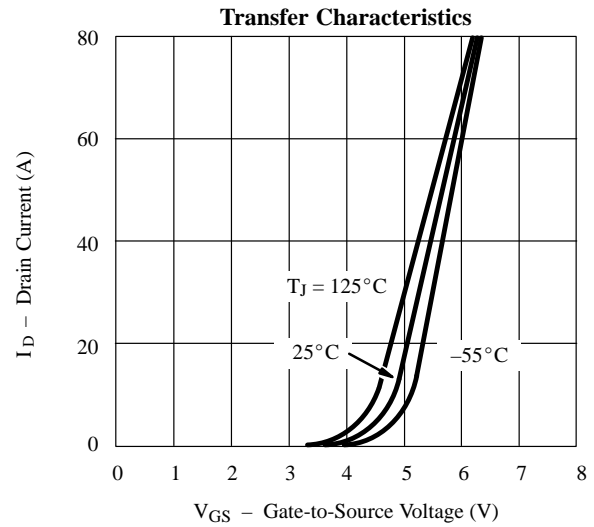
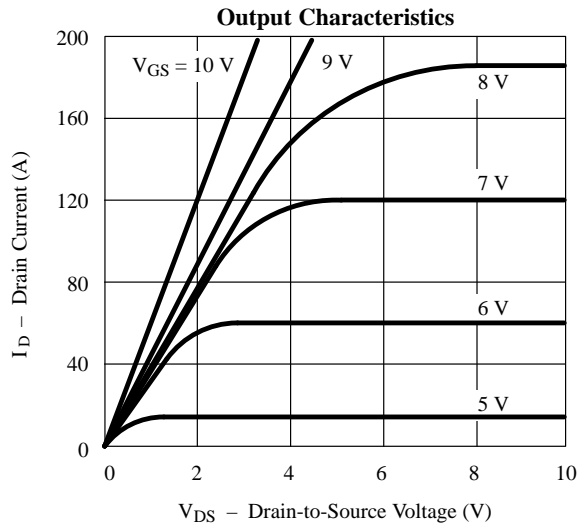
## Specifications ( $T_J = 25^\circ\text{C}$ Unless Otherwise Noted)

| Parameter   | Symbol        | Test Condition  | Min | Typ <sup>a</sup> | Max       | Unit          |
|---|---------------|---|-----|------------------|-----------|---------------|
| <b>Static</b>   |               |   |     |                  |           |               |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$   | 60  |                  |           | V             |
| Gate Threshold Voltage  | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_{DS} = 1\ \text{mA}$  | 2.0 |                  | 4.0       |               |
| Gate-Body Leakage   | $I_{GSS}$     | $V_{DS} = 0\ \text{V}, V_{GS} = \pm 20\ \text{V}$   |     |                  | $\pm 500$ | nA            |
| Zero Gate Voltage Drain Current   | $I_{DSS}$     | $V_{DS} = 48\ \text{V}, V_{GS} = 0\ \text{V}$   |     |                  | 25        | $\mu\text{A}$ |
|   |               | $V_{DS} = 48\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 125^\circ\text{C}$  |     |                  | 250       |               |
|   |               | $V_{DS} = 48\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 175^\circ\text{C}$  |     |                  | 500       |               |
| On-State Drain Current <sup>b</sup>   | $I_{D(on)}$   | $V_{DS} = 10\ \text{V}, V_{GS} = 10\ \text{V}$  | 60  |                  |           | A             |
| Drain-Source On-State Resistance <sup>b</sup>   | $r_{DS(on)}$  | $V_{GS} = 10\ \text{V}, I_D = 30\ \text{A}$   |     | 0.013            | 0.018     | $\Omega$      |
|   |               | $V_{GS} = 10\ \text{V}, I_D = 30\ \text{A}, T_J = 125^\circ\text{C}$  |     | 0.023            | 0.030     |               |
|   |               | $V_{GS} = 10\ \text{V}, I_D = 30\ \text{A}, T_J = 175^\circ\text{C}$  |     | 0.026            | 0.036     |               |
| Forward Transconductance <sup>b</sup>   | $g_{fs}$      | $V_{DS} = 15\ \text{V}, I_D = 30\ \text{A}$   |     | 45               |           | S             |
| <b>Dynamic</b>  |               |   |     |                  |           |               |
| Input Capacitance   | $C_{iss}$     | $V_{GS} = 0\ \text{V}, V_{DS} = 25\ \text{V}, f = 1\ \text{MHz}$  |     | 2600             |           | pF            |
| Output Capacitance  | $C_{oss}$     |   |     | 800              |           |               |
| Reverse Transfer Capacitance  | $C_{rss}$     |   |     | 200              |           |               |
| Total Gate Charge <sup>c</sup>  | $Q_g$         | $V_{DS} = 30\ \text{V}, V_{GS} = 10\ \text{V}, I_D = 60\ \text{A}$  |     | 85               | 100       | nC            |
| Gate-Source Charge <sup>c</sup>   | $Q_{gs}$      |   |     | 15               | 20        |               |
| Gate-Drain Charge <sup>c</sup>  | $Q_{gd}$      |   |     | 35               | 50        |               |
| Turn-On Delay Time <sup>c</sup>   | $t_{d(on)}$   | $V_{DD} = 30\ \text{V}, R_L = 1\ \Omega$<br>$I_D \approx 30\ \text{A}, V_{GEN} = 10\ \text{V}, R_G = 2.5\ \Omega$ |     | 15               | 30        | ns            |
| Rise Time <sup>c</sup>  | $t_r$         |   |     | 20               | 35        |               |
| Turn-Off Delay Time <sup>c</sup>  | $t_{d(off)}$  |   |     | 50               | 65        |               |
| Fall Time <sup>c</sup>  | $t_f$         |   |     | 20               | 30        |               |
| <b>Source-Drain Diode Ratings and Characteristics (<math>T_C = 25^\circ\text{C}</math>)</b> |               |   |     |                  |           |               |
| Continuous Current  | $I_s$         |   |     |                  | 60        | A             |
| Pulsed Current  | $I_{SM}$      |   |     |                  | 240       |               |
| Forward Voltage <sup>b</sup>  | $V_{SD}$      | $I_F = 60\ \text{A}, V_{GS} = 0\ \text{V}$  |     |                  | 2.0       | V             |
| Reverse Recovery Time   | $t_{rr}$      | $I_F = 60\ \text{A}, dI_F/dt = 100\ \text{A}/\mu\text{s}$   |     | 160              |           | ns            |
| Peak Reverse Recovery Current   | $I_{RM(REC)}$ |   |     | 13               |           | A             |
| Reverse Recovery Charge   | $Q_{rr}$      |   |     | 1.0              |           | $\mu\text{C}$ |

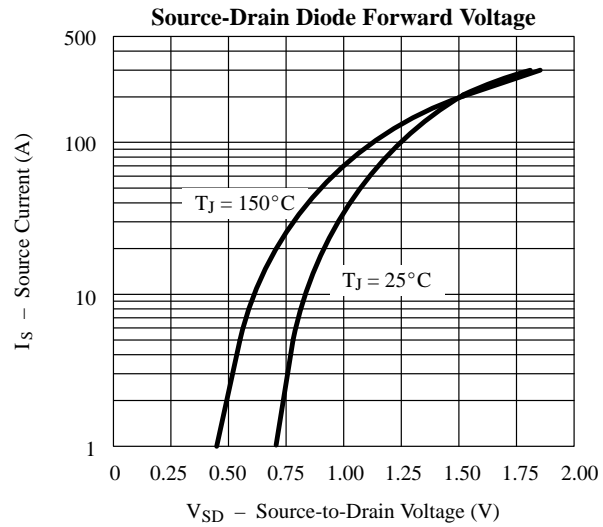
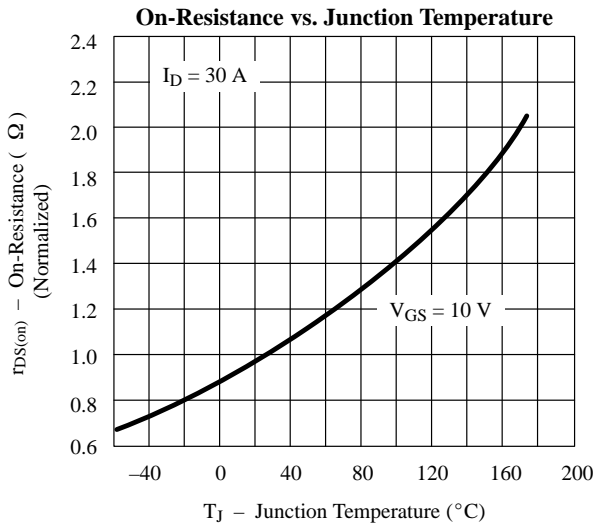
Notes:

- For design aid only; not subject to production testing.
- Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Independent of operating temperature.

## Typical Characteristics (25°C Unless Otherwise Noted)



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## Thermal Ratings

