

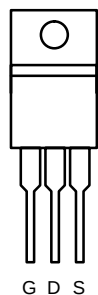


## N-Channel 60-V (D-S), 175°C MOSFET

## PRODUCT SUMMARY

| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A)       |
|-------------------|---------------------------|-----------------|
| 60                | 0.014                     | 70 <sup>a</sup> |

TO-220AB

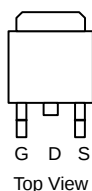


Top View

SUP70N06-14

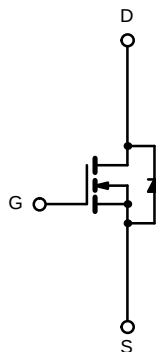
DRAIN connected to TAB

TO-263



Top View

SUB70N06-14



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 ( $T_J = 175^\circ\text{C}$ ) | $T_C = 25^\circ\text{C}$                       | $I_D$          | 70 <sup>a</sup>  | A                |
|                                                        | $T_C = 100^\circ\text{C}$                      |                | 49               |                  |
| Pulsed Drain Current                                   |                                                | $I_{DM}$       | 160              |                  |
| Avalanche Current                                      |                                                | $I_{AR}$       | 70               |                  |
| Repetitive Avalanche Energy <sup>b</sup>               |                                                | $E_{AR}$       | 180              | mJ               |
| Power Dissipation                                      | $T_C = 25^\circ\text{C}$ (TO-220AB and TO-263) | $P_D$          | 142 <sup>c</sup> | W                |
|                                                        | $T_A = 25^\circ\text{C}$ (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 | PCB Mount (TO-263) <sup>d</sup> | $R_{thJA}$ | 40    | $^\circ\text{C/W}$ |
|                     | Free Air (TO-220AB)             |            | 62.5  |                    |
| Junction-to-Case    |                                 | $R_{thJC}$ | 1.05  |                    |

## 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).

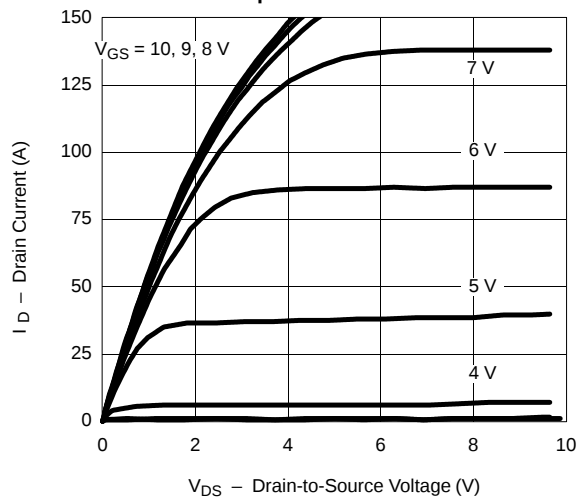
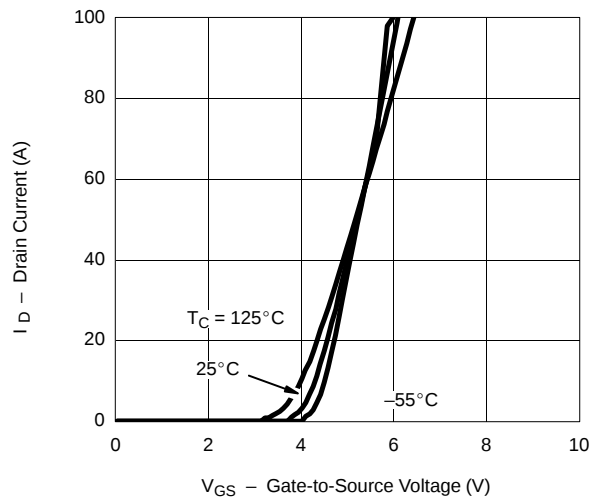
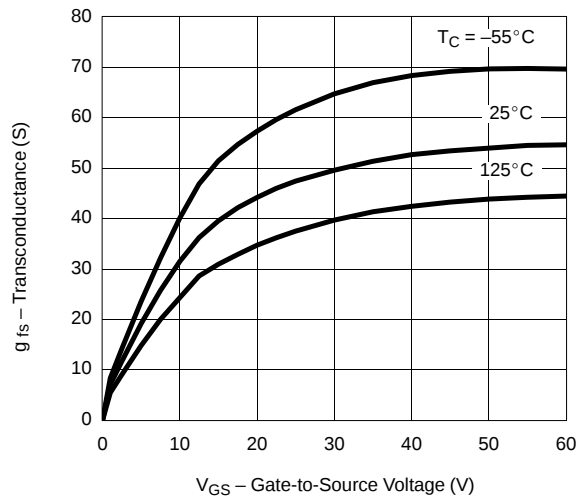
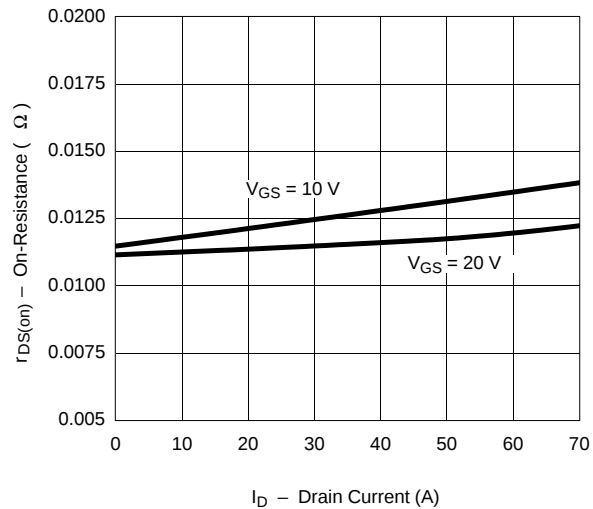
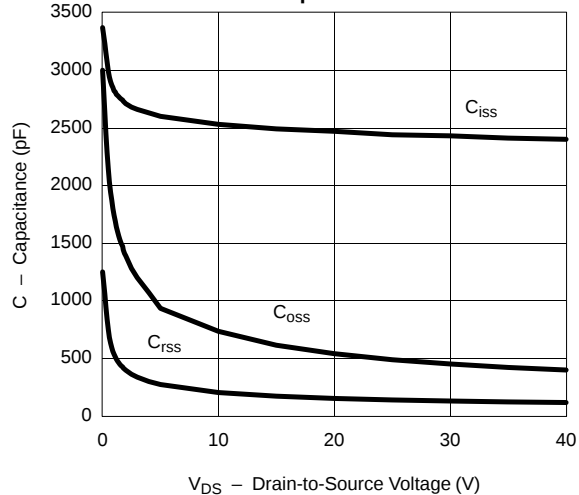
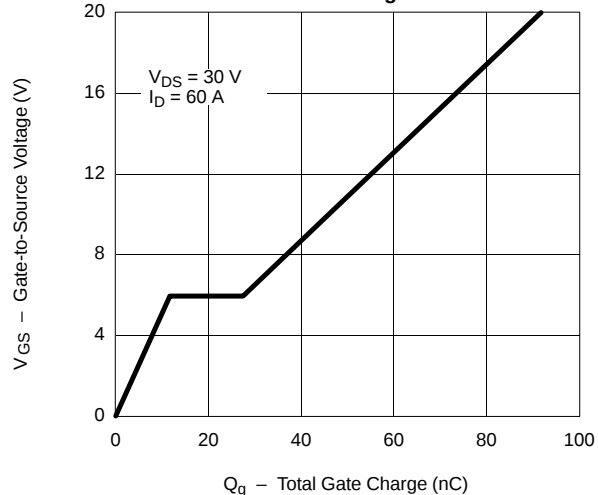
For SPICE model information via the Worldwide Web: <http://www.vishay.com/www/product/spice.htm>



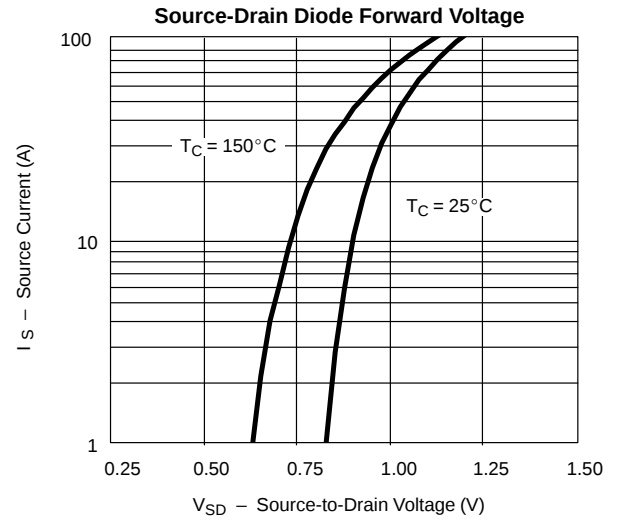
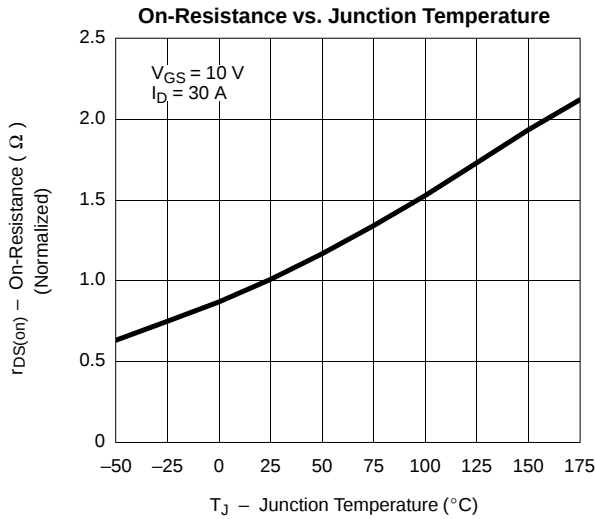
| SPECIFICATIONS (T <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)                       |                      |                                                                                                                           |     |      |       |      |
|--------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------|-----|------|-------|------|
| 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                                                                            | 60  |      |       | V    |
| Gate Threshold Voltage                                                               | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 1 mA                                                                | 2.0 | 3.0  | 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> = 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                                                    |     |      | 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                                                                             | 70  |      |       | 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                                                                             |     |      | 0.014 | Ω    |
|                                                                                      |                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 125 °C                                                    |     |      | 0.023 |      |
|                                                                                      |                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 175 °C                                                    |     |      | 0.028 |      |
| Forward Transconductance <sup>a</sup>                                                | g <sub>fs</sub>      | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A                                                                             | 25  | 50   |       | 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                                                                  |     | 2400 |       | pF   |
| Output Capacitance                                                                   | C <sub>oss</sub>     |                                                                                                                           |     | 490  |       |      |
| Reverse Transfer Capacitance                                                         | C <sub>rss</sub>     |                                                                                                                           |     | 130  |       |      |
| Total Gate Charge <sup>c</sup>                                                       | Q <sub>g</sub>       | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 60 A                                                     |     | 45   | 70    | nC   |
| Gate-Source Charge <sup>c</sup>                                                      | Q <sub>gs</sub>      |                                                                                                                           |     | 12   |       |      |
| Gate-Drain Charge <sup>c</sup>                                                       | Q <sub>gd</sub>      |                                                                                                                           |     | 16   |       |      |
| Turn-On Delay Time <sup>c</sup>                                                      | t <sub>d(on)</sub>   | V <sub>DD</sub> = 30 V, R <sub>L</sub> = 0.47 Ω<br>I <sub>D</sub> = 60 A, V <sub>GEN</sub> = 10 V, R <sub>G</sub> = 2.5 Ω |     | 13   | 30    | ns   |
| Rise Time <sup>c</sup>                                                               | t <sub>r</sub>       |                                                                                                                           |     | 11   | 30    |      |
| Turn-Off Delay Time <sup>c</sup>                                                     | t <sub>d(off)</sub>  |                                                                                                                           |     | 30   | 60    |      |
| Fall Time <sup>c</sup>                                                               | t <sub>f</sub>       |                                                                                                                           |     | 11   | 25    |      |
| Source-Drain Diode Ratings and Characteristics (T <sub>C</sub> = 25 °C) <sup>b</sup> |                      |                                                                                                                           |     |      |       |      |
| Continuous Current                                                                   | I <sub>S</sub>       |                                                                                                                           |     |      | 70    | A    |
| Pulsed Current                                                                       | I <sub>SM</sub>      |                                                                                                                           |     |      | 160   |      |
| Forward Voltage <sup>a</sup>                                                         | V <sub>SD</sub>      | I <sub>F</sub> = 70 A, V <sub>GS</sub> = 0 V                                                                              |     |      | 1.4   | V    |
| Reverse Recovery Time                                                                | t <sub>rr</sub>      | I <sub>F</sub> = 60 A, di/dt = 100 A/μs                                                                                   |     | 47   |       | ns   |
| Peak Reverse Recovery Current                                                        | I <sub>RM(REC)</sub> |                                                                                                                           |     | 3.5  |       | A    |
| Reverse Recovery Charge                                                              | Q <sub>rr</sub>      |                                                                                                                           |     | 0.08 |       | 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)****Output Characteristics****Transfer Characteristics****Transconductance****On-Resistance vs. Drain Current****Capacitance****Gate Charge**

## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)



## THERMAL RATINGS

