



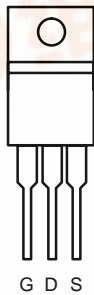
**SUP/SUB65P06-20**  
Vishay Siliconix

**P-Channel 60-V (D-S), 175 °C MOSFET**

| PRODUCT SUMMARY   |                           |                  |
|-------------------|---------------------------|------------------|
| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A)        |
| -60               | 0.020                     | -65 <sup>a</sup> |

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

TO-220AB

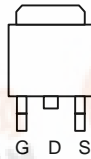


Top View

SUP65P06-20

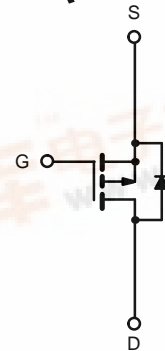
DRAIN connected to TAB

TO-263



Top View

SUB65P06-20



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 ( $T_J = 175^\circ\text{C}$ )                      | $I_D$          | $T_C = 25^\circ\text{C}$                        | -65 <sup>a</sup> |
|   |                | $T_C = 125^\circ\text{C}$                       | -39              |
| Pulsed Drain Current  | $I_{DM}$       | -200  | A                |
| Avalanche Current   | $I_{AR}$       | -60   |                  |
| Repetitive Avalanche Energy <sup>b</sup>                                    | $E_{AR}$       | 180   | mJ               |
| Power Dissipation   | $P_D$          | $T_C = 25^\circ\text{C}$ (TO-220AB and TO-263)  | 250 <sup>d</sup> |
|   |                | $T_A = 125^\circ\text{C}$ (TO-263) <sup>c</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>c</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. When mounted on 1" square PCB (FR-4 material).
- d. See SOA curve for voltage derating.

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



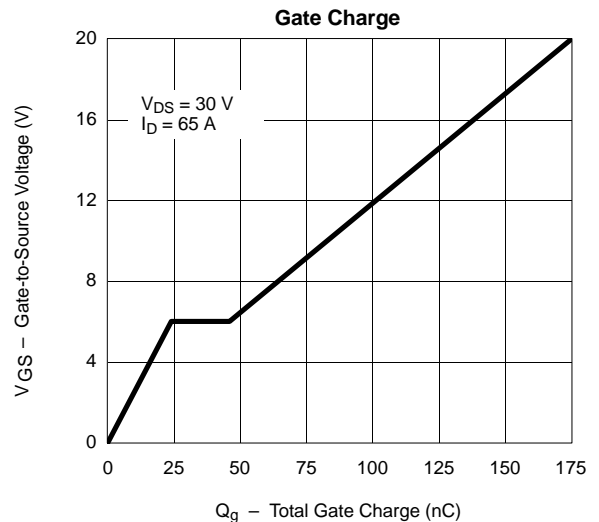
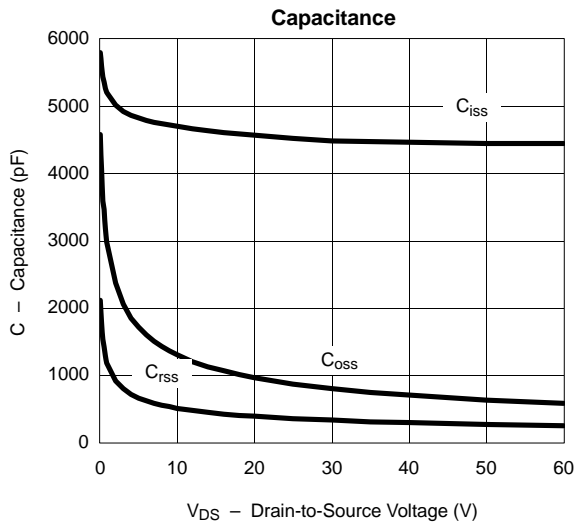
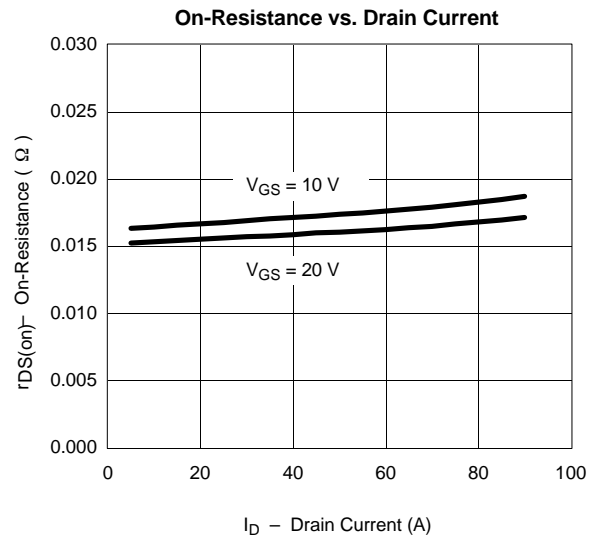
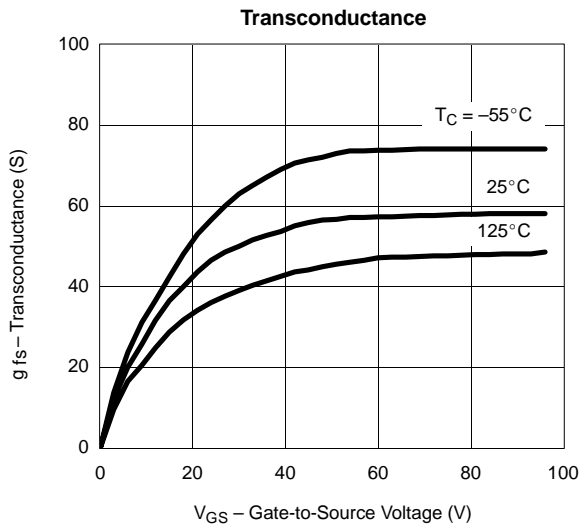
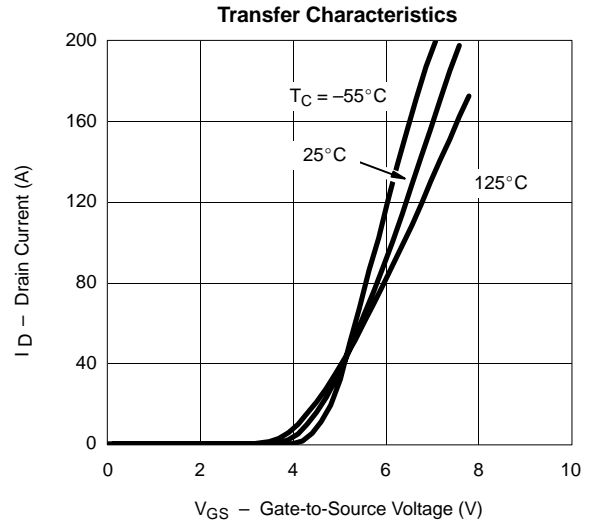
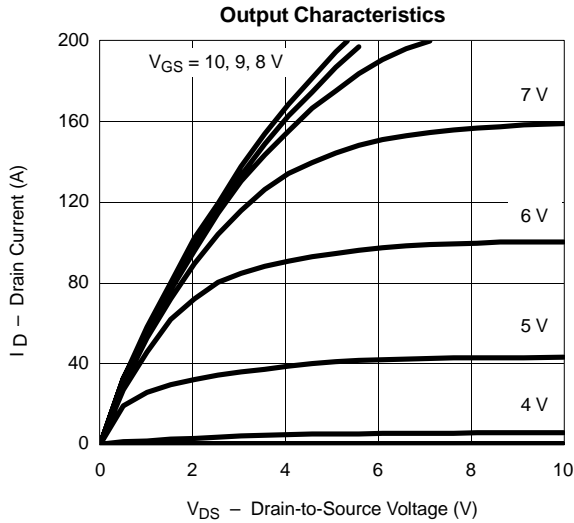
| SPECIFICATIONS (T <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)                            |                      |  |      |       |       |      |
|---|----------------------|--|------|-------|-------|------|
| Parameter   | Symbol               | Test Condition   | Min  | Typ   | Max   | Unit |
| <b>Static</b>   |                      |  |      |       |       |      |
| 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>D</sub> = -250 μA   | -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  | -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  |      | 0.017 | 0.020 | Ω    |
|   |                      | V <sub>GS</sub> = -10 V, I <sub>D</sub> = -30 A, T <sub>J</sub> = 125 °C   |      |       | 0.033 |      |
|   |                      | V <sub>GS</sub> = -10 V, I <sub>D</sub> = -30 A, T <sub>J</sub> = 175 °C   |      |       | 0.042 |      |
| Forward Transconductance <sup>a</sup>   | g <sub>fs</sub>      | V <sub>DS</sub> = -15 V, I <sub>D</sub> = -30 A  | 25   |       |       | 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>     |  |      | 870   |       |      |
| Reverse Transfer Capacitance  | C <sub>rss</sub>     |  |      | 350   |       |      |
| 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> = -65 A   |      | 85    | 120   | nC   |
| Gate-Source Charge <sup>c</sup>   | Q <sub>gs</sub>      |  |      | 24    |       |      |
| Gate-Drain Charge <sup>c</sup>  | Q <sub>gd</sub>      |  |      | 22    |       |      |
| 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> ≈ -65 A, V <sub>GEN</sub> = -10 V, R <sub>G</sub> = 2.5 Ω |      | 15    | 40    | ns   |
| Rise Time <sup>c</sup>  | t <sub>r</sub>       |  |      | 40    | 80    |      |
| Turn-Off Delay Time <sup>c</sup>  | t <sub>d(off)</sub>  |  |      | 65    | 120   |      |
| Fall Time <sup>c</sup>  | t <sub>f</sub>       |  |      | 30    | 60    |      |
| <b>Source-Drain Diode Ratings and Characteristics (T<sub>C</sub> = 25 °C)<sup>b</sup></b> |                      |  |      |       |       |      |
| Continuous Current  | I <sub>s</sub>       |  |      |       | -65   | A    |
| Pulsed Current  | I <sub>SM</sub>      |  |      |       | -200  |      |
| Forward Voltage <sup>a</sup>  | V <sub>SD</sub>      | I <sub>F</sub> = -65 A, V <sub>GS</sub> = 0 V  |      | -1.1  | -1.4  | V    |
| Reverse Recovery Time   | t <sub>rr</sub>      | I <sub>F</sub> = -65 A, di/dt = 100 A/μs   |      | 70    | 120   | ns   |
| Peak Reverse Recovery Current   | I <sub>RM(REC)</sub> |  |      | 7     | 9     | A    |
| Reverse Recovery Charge   | Q <sub>rr</sub>      |  |      | 0.245 | 0.54  | μC   |

Notes:

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

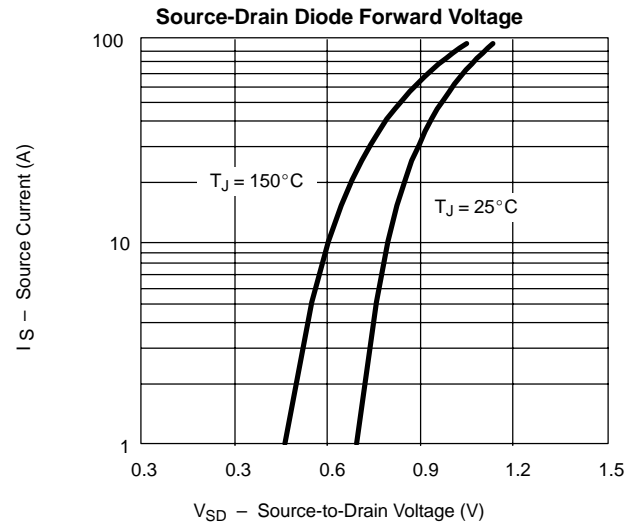
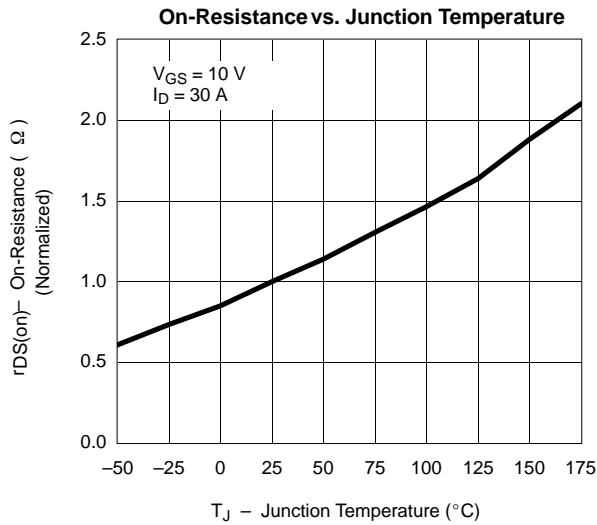


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**





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



### THERMAL RATINGS

