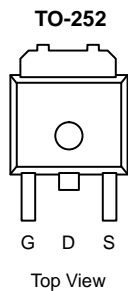




P-Channel 40-V (D-S), 175°C MOSFET

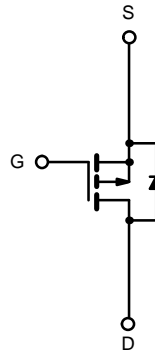
| PRODUCT SUMMARY |                           |           |
|-----------------|---------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
| -40             | 0.015 @ $V_{GS} = -10$ V  | -50       |
|                 | 0.023 @ $V_{GS} = -4.5$ V | -45       |

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



Order Number:  
SUD50P04-15

Drain Connected to Tab



P-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) |                           |                |                  |                  |
|---|---------------------------|----------------|------------------|------------------|
| Parameter   |                           | Symbol         | Limit            | Unit             |
| Drain-Source Voltage  |                           | $V_{DS}$       | -40              | V                |
| Gate-Source Voltage   |                           | $V_{GS}$       | $\pm 20$         |                  |
| Continuous Drain Current <sup>b</sup>                                       | $T_C = 25^\circ\text{C}$  | $I_D$          | -50              | A                |
|   | $T_C = 100^\circ\text{C}$ |                | -40              |                  |
| Pulsed Drain Current  |                           | $I_{DM}$       | -150             |                  |
| Continuous Source Current (Diode Conduction)                                |                           | $I_S$          | -50              |                  |
| Maximum Power Dissipation <sup>b</sup>                                      | $T_C = 25^\circ\text{C}$  | $P_D$          | 100 <sup>b</sup> | W                |
|   | $T_A = 25^\circ\text{C}$  |                | 3 <sup>a</sup>   |                  |
| Operating Junction and Storage Temperature Range                            |                           | $T_J, T_{stg}$ | -55 to 175       | $^\circ\text{C}$ |

| THERMAL RESISTANCE RATINGS               |                  |            |         |         |                    |
|--|------------------|------------|---------|---------|--------------------|
| Parameter                                |                  | Symbol     | Typical | Maximum | Unit               |
| Maximum Junction-to-Ambient <sup>a</sup> | $t \leq 10$ sec. | $R_{thJA}$ | 15      | 18      | $^\circ\text{C/W}$ |
|  | Steady State     |            | 40      | 50      |                    |
| Maximum Junction-to-Case                 |                  | $R_{thJC}$ | 1.2     | 1.5     |                    |

Notes

- a. Surface Mounted on 1" x 1" FR4 Board.
- b. See SOA curve for voltage derating.



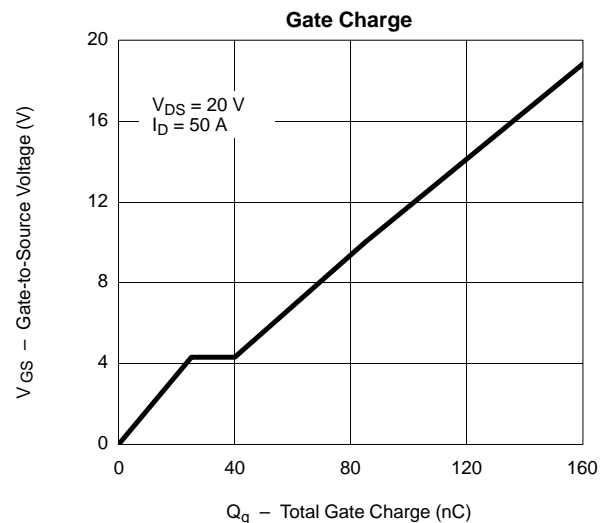
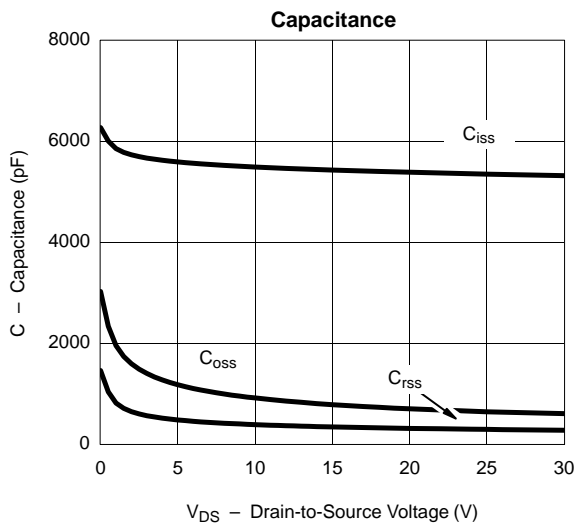
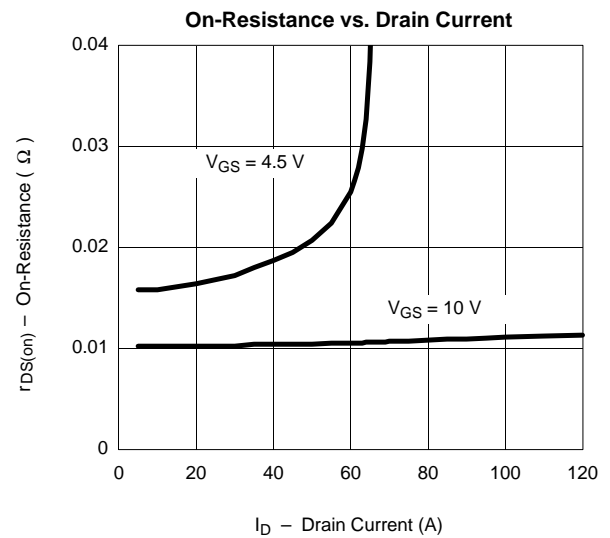
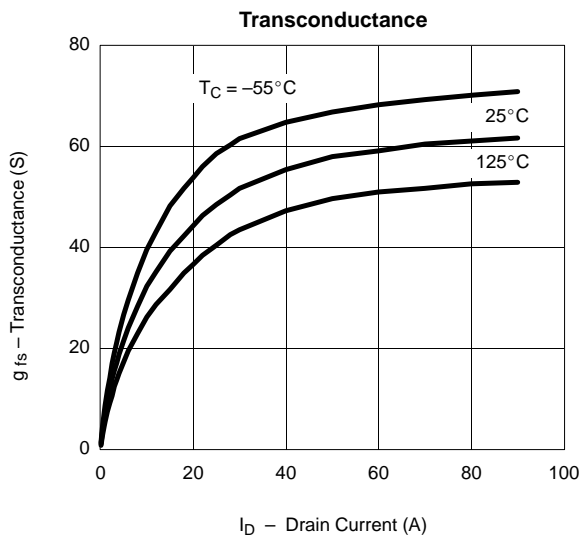
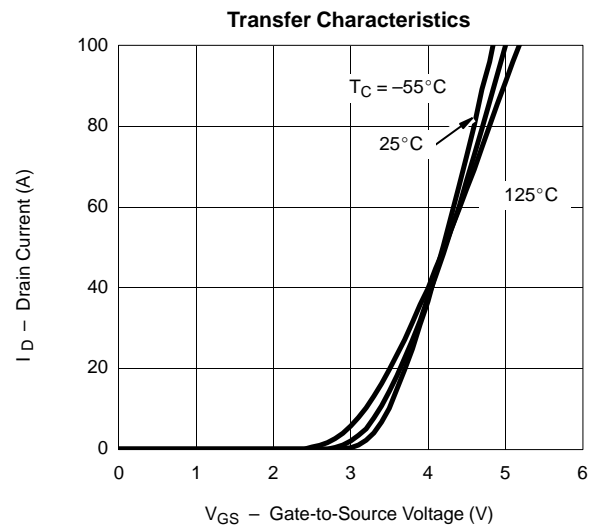
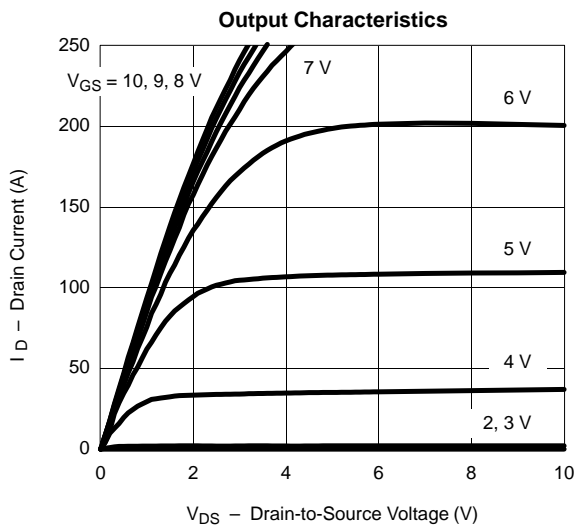
| <b>SPECIFICATIONS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)</b>         |                      |   |      |       |       |      |
|--|----------------------|---|------|-------|-------|------|
| Parameter  | Symbol               | Test Condition  | Min  | Typ   | Max   | Unit |
| <b>Static</b>  |                      |   |      |       |       |      |
| Drain-Source Breakdown Voltage   | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 μA   | -40  |       |       | V    |
| Gate Threshold Voltage   | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA  | -1.0 |       |       |      |
| 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> = -40 V, V <sub>GS</sub> = 0 V  |      |       | -1    | μA   |
|  |                      | V <sub>DS</sub> = -40 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C   |      |       | -50   |      |
| 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   |      | 0.012 | 0.015 | Ω    |
|  |                      | V <sub>GS</sub> = -10 V, I <sub>D</sub> = -30 A, T <sub>J</sub> = 125 °C  |      |       | 0.024 |      |
|  |                      | V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -20 A  |      | 0.018 | 0.023 |      |
| Forward Transconductance <sup>a</sup>  | g <sub>fs</sub>      | V <sub>DS</sub> = -15 V, I <sub>D</sub> = -30 A   | 20   |       |       | 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   |      | 5400  |       | pF   |
| Output Capacitance   | C <sub>oss</sub>     |   |      | 640   |       |      |
| Reverse Transfer Capacitance   | C <sub>rss</sub>     |   |      | 300   |       |      |
| Total Gate Charge <sup>c</sup>   | Q <sub>g</sub>       | V <sub>DS</sub> = -20 V, V <sub>GS</sub> = -10 V, I <sub>D</sub> = -50 A  |      | 85    | 130   | nC   |
| Gate-Source Charge <sup>c</sup>  | Q <sub>gs</sub>      |   |      | 25    |       |      |
| Gate-Drain Charge <sup>c</sup>   | Q <sub>gd</sub>      |   |      | 15    |       |      |
| Turn-On Delay Time <sup>c</sup>  | t <sub>d(on)</sub>   | V <sub>DD</sub> = -20 V, R <sub>L</sub> = 0.4 Ω<br>I <sub>D</sub> ≅ -50 A, V <sub>GEN</sub> = -10 V, R <sub>G</sub> = 2.5 Ω |      | 15    | 25    | ns   |
| Rise Time <sup>c</sup>   | t <sub>r</sub>       |   |      | 380   | 580   |      |
| Turn-Off Delay Time <sup>c</sup>   | t <sub>d(off)</sub>  |   |      | 75    | 115   |      |
| Fall Time <sup>c</sup>   | t <sub>f</sub>       |   |      | 140   | 210   |      |
| <b>Source-Drain Diode Ratings and Characteristic (T<sub>C</sub> = 25 °C)</b> |                      |   |      |       |       |      |
| Pulsed Current   | I <sub>SM</sub>      |   |      |       | -150  | A    |
| Diode Forward Voltage <sup>a</sup>   | V <sub>SD</sub>      | I <sub>F</sub> = -50 A, V <sub>GS</sub> = 0 V   |      | -1.2  | -1.5  | V    |
| Source-Drain Reverse Recovery Time   | t <sub>rr</sub>      | I <sub>F</sub> = -50 A, di/dt = 100 A/μs  |      | 40    | 80    | ns   |

**Notes**

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

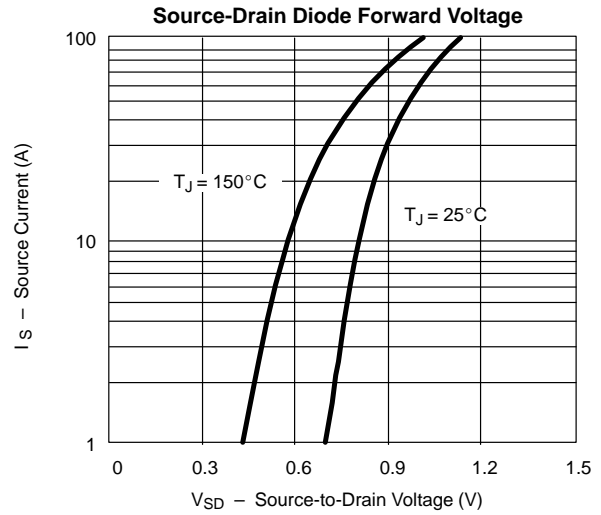
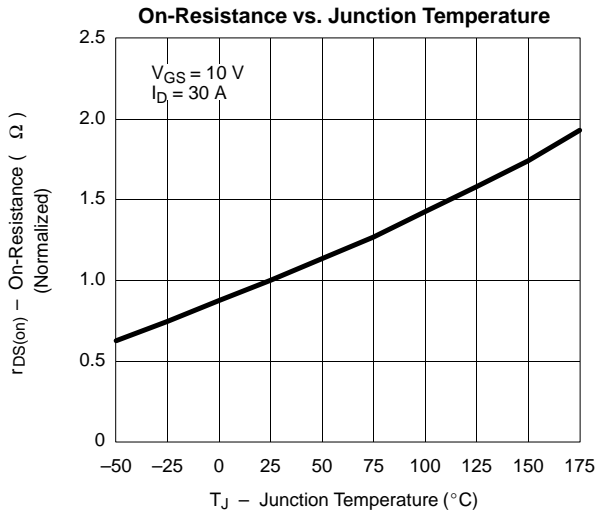


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**





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



**THERMAL RATINGS**

