



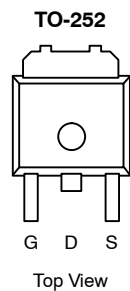
## N-Channel 30-V (D-S), 175°C, MOSFET PWM Optimized

## PRODUCT SUMMARY

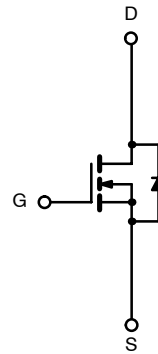
| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) <sup>a</sup> |
|-------------------|---------------------------|------------------------|
| 30                | 0.010 @ $V_{GS} = 10$ V   | 20                     |
|                   | 0.014 @ $V_{GS} = 4.5$ V  | 18                     |

## FEATURES

- TrenchFET® Power MOSFET
- 175°C Maximum Junction Temperature
- 100%  $R_g$  Tested



Ordering Information: SUD50N03-10BP



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)

| Parameter                                                           |                           | Symbol         | Limit            | Unit             |
|---------------------------------------------------------------------|---------------------------|----------------|------------------|------------------|
| Drain-Source Voltage                                                |                           | $V_{DS}$       | 30               | V                |
| Gate-Source Voltage                                                 |                           | $V_{GS}$       | $\pm 20$         |                  |
| Continuous Drain Current ( $T_J = 175^\circ\text{C}$ ) <sup>a</sup> | $T_A = 25^\circ\text{C}$  | $I_D$          | 20               | A                |
|                                                                     | $T_A = 100^\circ\text{C}$ |                | 14               |                  |
| Pulsed Drain Current                                                |                           | $I_{DM}$       | 100              |                  |
| Continuous Source Current (Diode Conduction) <sup>a</sup>           |                           | $I_S$          | 20               | W                |
| Maximum Power Dissipation                                           | $T_C = 25^\circ\text{C}$  | $P_D$          | 71 <sup>b</sup>  |                  |
|                                                                     | $T_A = 25^\circ\text{C}$  |                | 8.3 <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                 | Steady State    | $R_{thJC}$ | 1.75    | 2.1     |                    |

## Notes:

- a. Surface mounted on 1" x 1" FR4 Board,  $t \leq 10$  sec.  
b. See SOA curve for voltage derating.

| MOSFET SPECIFICATIONS ( $T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)                                |               |                                                                                                                        |     |        |           |               |
|---------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------|-----|--------|-----------|---------------|
| Parameter                                                                                               | Symbol        | Test Condition                                                                                                         | Min | Typ    | Max       | Unit          |
| <b>Static</b>                                                                                           |               |                                                                                                                        |     |        |           |               |
| Drain-Source Breakdown Voltage                                                                          | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$                                                                    | 30  |        |           | V             |
| Gate Threshold Voltage                                                                                  | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_{DS} = 250\text{ }\mu\text{A}$                                                                     | 0.8 | 2      |           |               |
| Gate-Body Leakage                                                                                       | $I_{GSS}$     | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$                                                                        |     |        | $\pm 100$ | nA            |
| Zero Gate Voltage Drain Current                                                                         | $I_{DSS}$     | $V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}$                                                                            |     |        | 1         | $\mu\text{A}$ |
|                                                                                                         |               | $V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$                                                   |     |        | 50        |               |
|                                                                                                         |               | $V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}, T_J = 175^\circ\text{C}$                                                   |     |        | 150       |               |
| On-State Drain Current <sup>a</sup>                                                                     | $I_{D(on)}$   | $V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$                                                                            | 50  |        |           | A             |
| Drain-Source On-State Resistance <sup>a</sup>                                                           | $r_{DS(on)}$  | $V_{GS} = 10\text{ V}, I_D = 15\text{ A}$                                                                              |     | 0.0075 | 0.010     | $\Omega$      |
|                                                                                                         |               | $V_{GS} = 10\text{ V}, I_D = 15\text{ A}, T_J = 125^\circ\text{C}$                                                     |     |        | 0.016     |               |
|                                                                                                         |               | $V_{GS} = 10\text{ V}, I_D = 15\text{ A}, T_J = 175^\circ\text{C}$                                                     |     |        | 0.019     |               |
|                                                                                                         |               | $V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$                                                                             |     | 0.011  | 0.014     |               |
| Forward Transconductance <sup>a</sup>                                                                   | $g_{fs}$      | $V_{DS} = 15\text{ V}, I_D = 15\text{ A}$                                                                              | 20  |        |           | S             |
| <b>Dynamic<sup>b</sup></b>                                                                              |               |                                                                                                                        |     |        |           |               |
| Input Capacitance                                                                                       | $C_{iss}$     | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                                          |     | 1500   |           | pF            |
| Output Capacitance                                                                                      | $C_{oss}$     |                                                                                                                        |     | 530    |           |               |
| Reverse Transfer Capacitance                                                                            | $C_{rss}$     |                                                                                                                        |     | 240    |           |               |
| Total Gate Charge <sup>c</sup>                                                                          | $Q_g$         | $V_{DS} = 15\text{ V}, V_{GS} = 5\text{ V}, I_D = 20\text{ A}$                                                         |     | 15.5   | 19        | nC            |
| Gate-Source Charge <sup>c</sup>                                                                         | $Q_{gs}$      |                                                                                                                        |     | 5      |           |               |
| Gate-Drain Charge <sup>c</sup>                                                                          | $Q_{gd}$      |                                                                                                                        |     | 6      |           |               |
| Gate Resistance                                                                                         | $R_g$         |                                                                                                                        | 0.5 |        | 4.1       | $\Omega$      |
| Turn-On Delay Time <sup>c</sup>                                                                         | $t_{d(on)}$   | $V_{DD} = 15\text{ V}, R_L = 0.3\text{ }\Omega$<br>$I_D = 20\text{ A}, V_{GEN} = 10\text{ V}, R_G = 2.5\text{ }\Omega$ |     | 10     | 18        | ns            |
| Rise Time <sup>c</sup>                                                                                  | $t_r$         |                                                                                                                        |     | 8      | 15        |               |
| Turn-Off Delay Time <sup>c</sup>                                                                        | $t_{d(off)}$  |                                                                                                                        |     | 25     | 45        |               |
| Fall Time <sup>c</sup>                                                                                  | $t_f$         |                                                                                                                        |     | 9      | 16        |               |
| Gate Resistance                                                                                         | $R_g$         |                                                                                                                        |     | 2.3    |           | $\Omega$      |
| <b>Source-Drain Diode Ratings and Characteristics (<math>T_C = 25^\circ\text{C}</math>)<sup>b</sup></b> |               |                                                                                                                        |     |        |           |               |
| Continuous Current                                                                                      | $I_S$         |                                                                                                                        |     |        | 50        | A             |
| Pulsed Current                                                                                          | $I_{SM}$      |                                                                                                                        |     |        | 100       |               |
| Forward Voltage <sup>a</sup>                                                                            | $V_{SD}$      | $I_F = 100\text{ A}, V_{GS} = 0\text{ V}$                                                                              |     | 1.2    | 1.5       | V             |
| Reverse Recovery Time                                                                                   | $t_{rr}$      | $I_F = 20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$                                                                  |     | 30     | 60        | ns            |

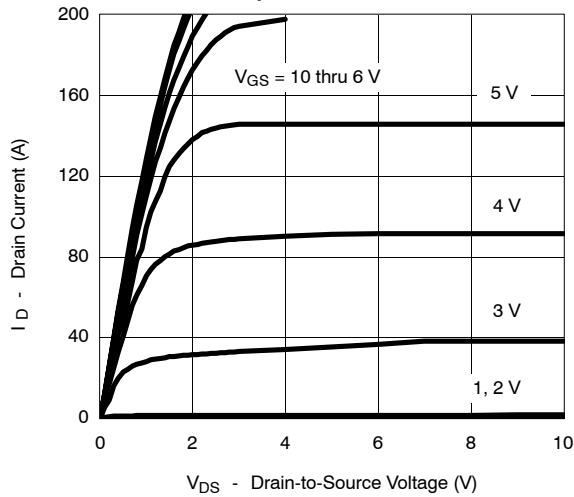
## Notes:

- 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.

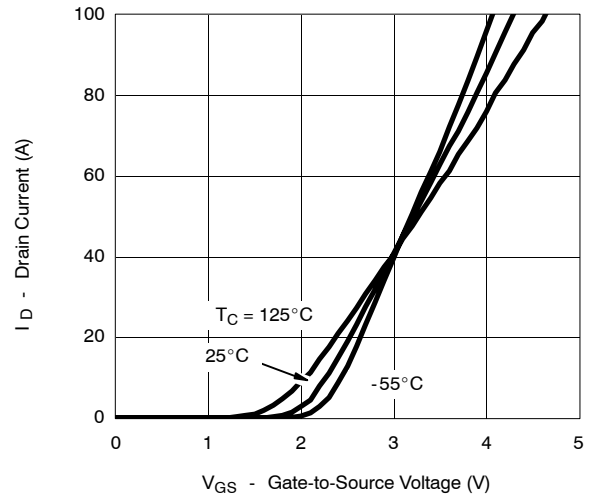


**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

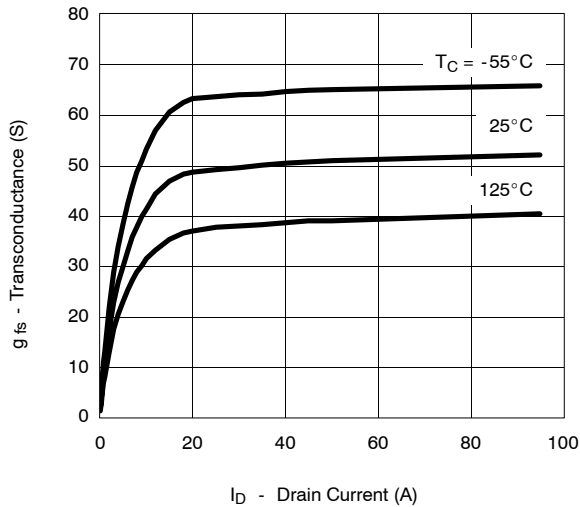
**Output Characteristics**



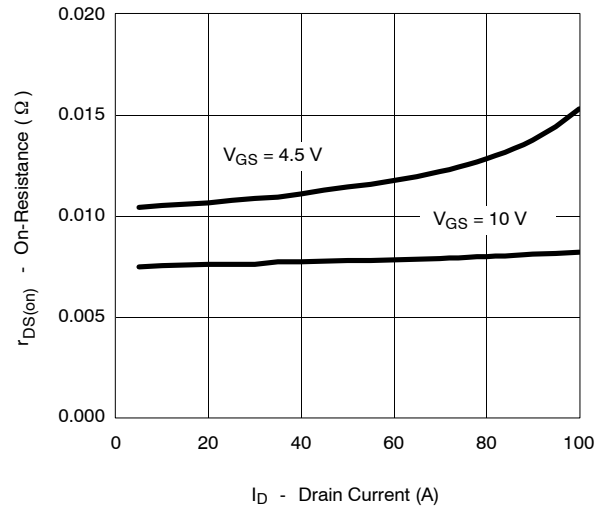
**Transfer Characteristics**



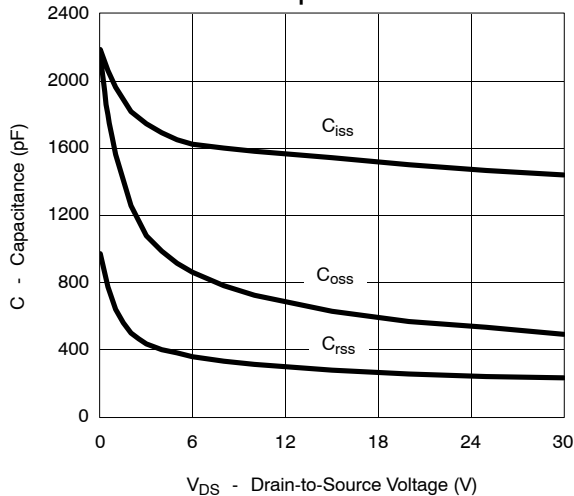
**Transconductance**



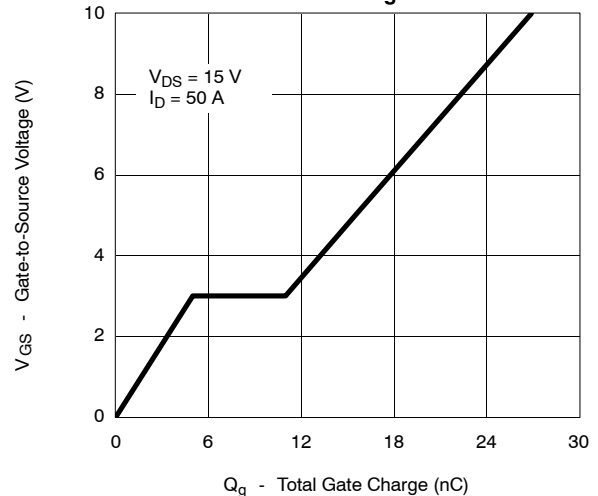
**On-Resistance vs. Drain Current**



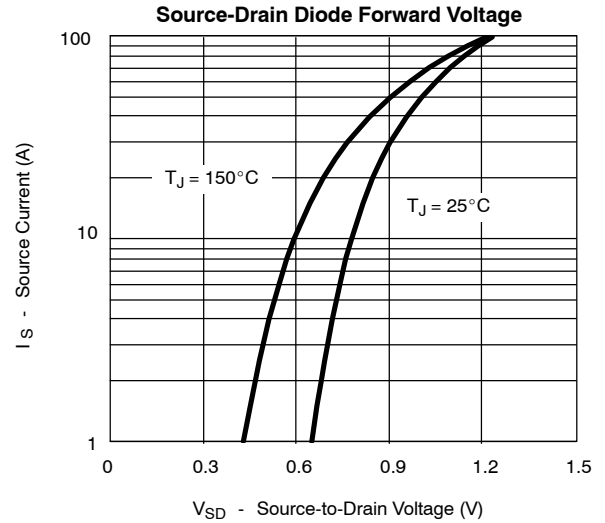
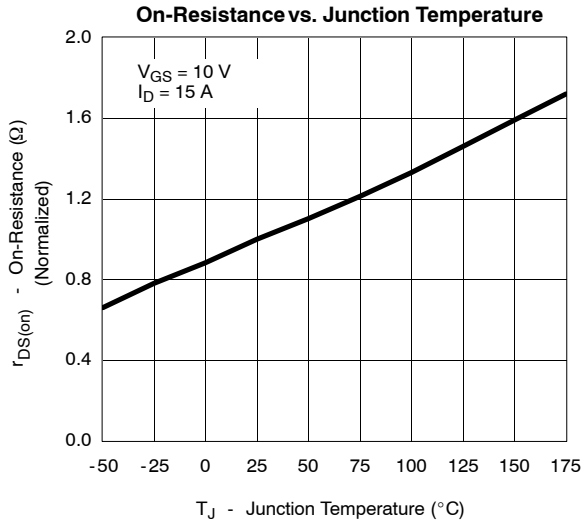
**Capacitance**



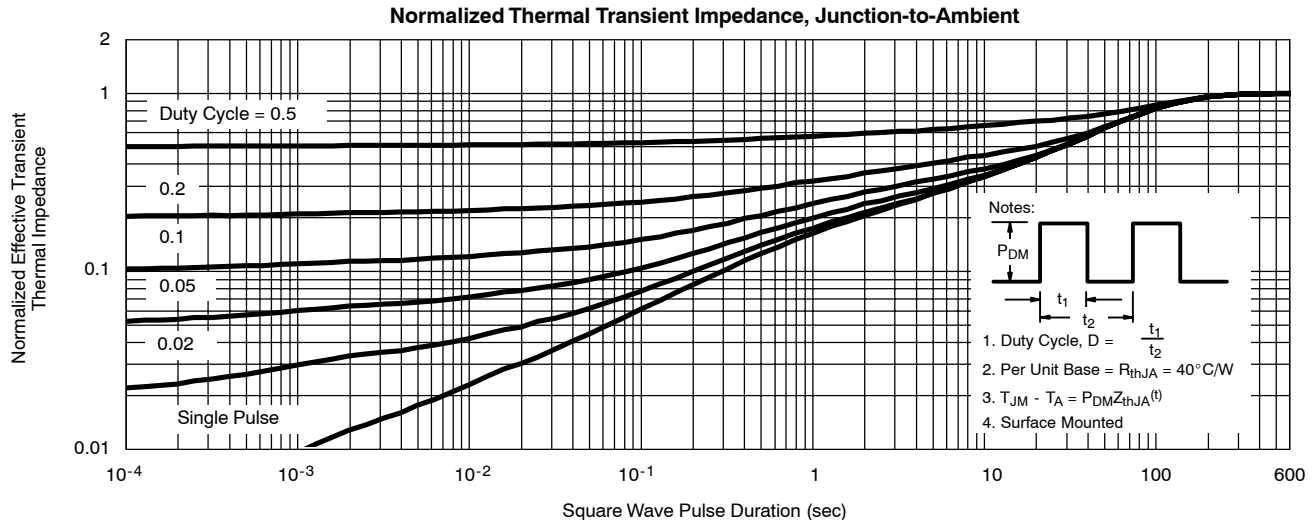
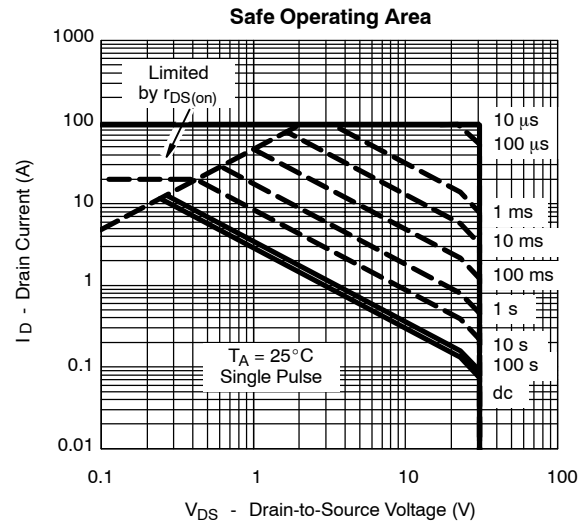
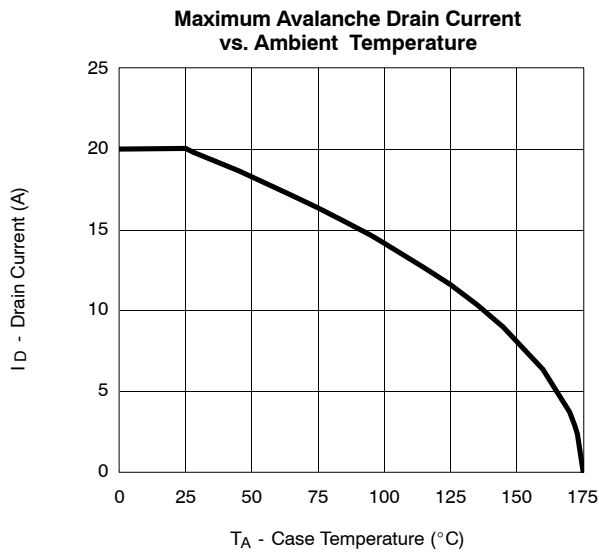
**Gate Charge**



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



### THERMAL RATINGS





### Disclaimer

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