



N-Channel 20-V (D-S) 175°C MOSFET

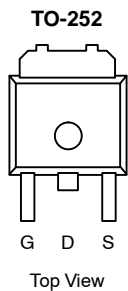
| PRODUCT SUMMARY | | |
|---------------------|---------------------------------|---------------------------------|
| V _{DS} (V) | r _{DS(on)} (Ω) | I _D (A) ^a |
| 20 | 0.0095 @ V _{GS} = 10 V | 20 |
| | 0.017 @ V _{GS} = 4.5 V | 15 |

FEATURES

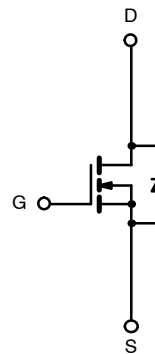
- TrenchFET® Power MOSFET
- 175°C Junction Temperature
- PWM Optimized for High Efficiency
- 100% R_g Tested

APPLICATIONS

- High-Side Synchronous Buck DC/DC Conversion
 - Desktop
 - Server



Drain Connected to Tab



Ordering Information: SUD50N02-09P
SUD50N02-09P—E3 (Lead Free)

| ABSOLUTE MAXIMUM RATINGS (T _A = 25°C UNLESS OTHERWISE NOTED) | | | | |
|---|------------------------|-----------------------------------|------------------|------|
| Parameter | | Symbol | Limit | Unit |
| Drain-Source Voltage | | V _{DS} | 20 | V |
| Gate-Source Voltage | | V _{GS} | ±20 | |
| Continuous Drain Current ^a | T _A = 25°C | I _D | 20 | A |
| | T _C = 100°C | | 14 | |
| Pulsed Drain Current | | I _{DM} | 100 | |
| Continuous Source Current (Diode Conduction) ^a | | I _S | 4.3 | |
| Avalanche Current | L = 0.1 mH | I _{AS} | 29 | |
| Single Pulse Avalanche Energy | | E _{AS} | 42 | mJ |
| Maximum Power Dissipation | T _A = 25°C | P _D | 6.5 ^a | W |
| | T _C = 25°C | | 39.5 | |
| Operating Junction and Storage Temperature Range | | T _J , T _{stg} | -55 to 175 | °C |

| THERMAL RESISTANCE RATINGS | | | | | |
|--|--------------|-------------------|---------|---------|------|
| Parameter | | Symbol | Typical | Maximum | Unit |
| Maximum Junction-to-Ambient ^a | t ≤ 10 sec | R _{thJA} | 19 | 23 | °C/W |
| | Steady State | | 40 | 50 | |
| Maximum Junction-to-Case | | R _{thJC} | 3.1 | 3.8 | |

Notes

- Surface Mounted on FR4 Board, t ≤ 10 sec.
- Limited by package



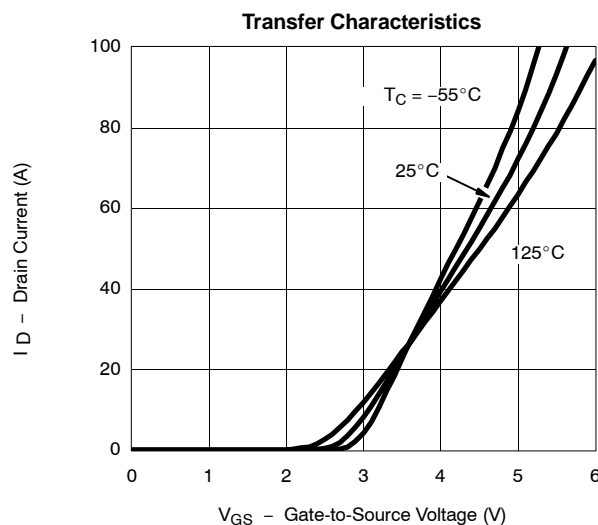
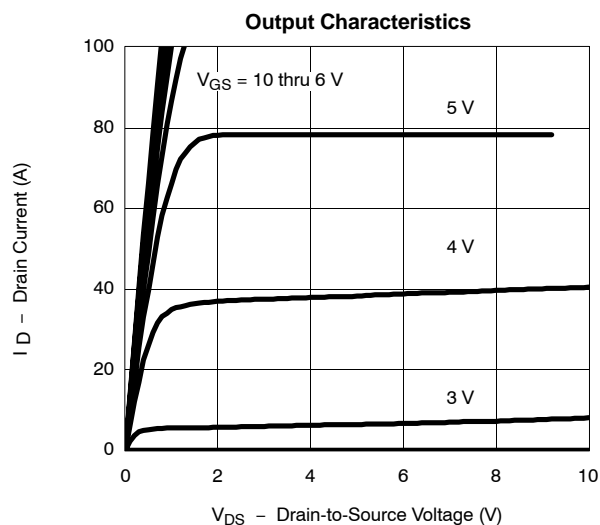
SPECIFICATIONS (T_J = 25 °C UNLESS OTHERWISE NOTED)

| Parameter | Symbol | Test Condition | Min | Typ ^a | Max | Unit |
|--|----------------------|--|-----|------------------|--------|------|
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V _{(BR)DSS} | V _{GS} = 0 V, I _D = 250 μA | 20 | | | V |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250 μA | 0.8 | | 3.0 | |
| Gate-Body Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±20 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 20 V, V _{GS} = 0 V | | | 1 | μA |
| | | V _{DS} = 20 V, V _{GS} = 0 V, T _J = 125 °C | | | 50 | |
| On-State Drain Current ^b | I _{D(on)} | V _{DS} = 5 V, V _{GS} = 10 V | 50 | | | A |
| Drain-Source On-State Resistance ^b | r _{DS(on)} | V _{GS} = 10 V, I _D = 20 A | | 0.008 | 0.0095 | Ω |
| | | V _{GS} = 10 V, I _D = 20 A, T _J = 125 °C | | | 0.014 | |
| | | V _{GS} = 4.5 V, I _D = 20 A | | 0.0135 | 0.017 | |
| Forward Transconductance ^b | g _{fs} | V _{DS} = 15 V, I _D = 20 A | 15 | | | S |
| Dynamic^a | | | | | | |
| Input Capacitance | C _{iss} | V _{GS} = 0 V, V _{DS} = 10 V, f = 1 MHz | | 1300 | | pF |
| Output Capacitance | C _{oss} | | | 470 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 275 | | |
| Total Gate Charge ^c | Q _g | V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 50 A | | 10.5 | 16 | nC |
| Gate-Source Charge ^c | Q _{gs} | | | 4.2 | | |
| Gate-Drain Charge ^c | Q _{gd} | | | 4.0 | | |
| Gate Resistance | R _g | | 1.6 | 4.0 | 6 | |
| Turn-On Delay Time ^c | t _{d(on)} | V _{DD} = 10 V, R _L = 0.2 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _g = 2.5 Ω | | 8 | 12 | ns |
| Rise Time ^c | t _r | | | 10 | 15 | |
| Turn-Off Delay Time ^c | t _{d(off)} | | | 25 | 40 | |
| Fall Time ^c | t _f | | | 12 | 20 | |
| Source-Drain Diode Ratings and Characteristic (T_C = 25 °C) | | | | | | |
| Pulsed Current | I _{SM} | | | | 100 | A |
| Diode Forward Voltage ^b | V _{SD} | I _F = 50 A, V _{GS} = 0 V | | 1.2 | 1.5 | V |
| Source-Drain Reverse Recovery Time | t _{rr} | I _F = 50 A, di/dt = 100 A/μs | | 35 | 70 | ns |

Notes

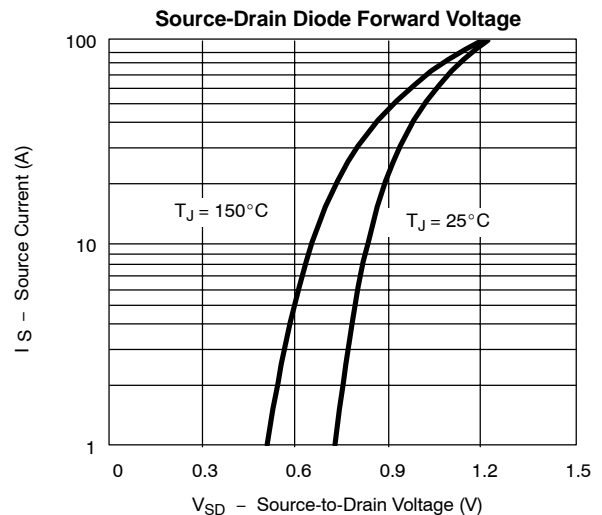
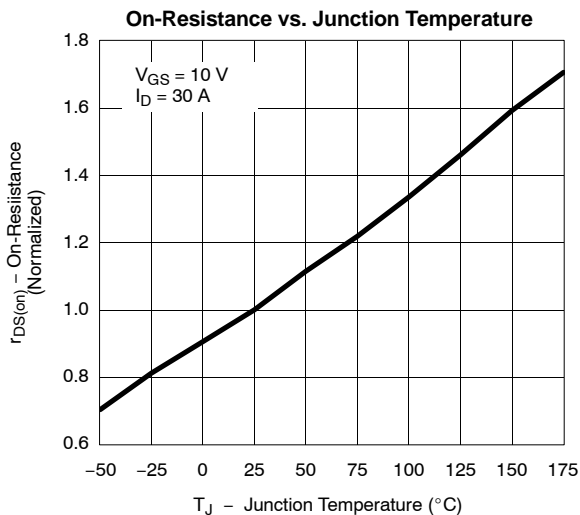
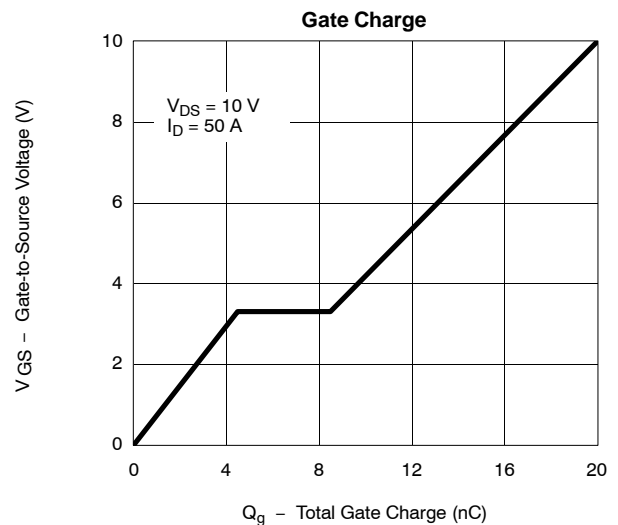
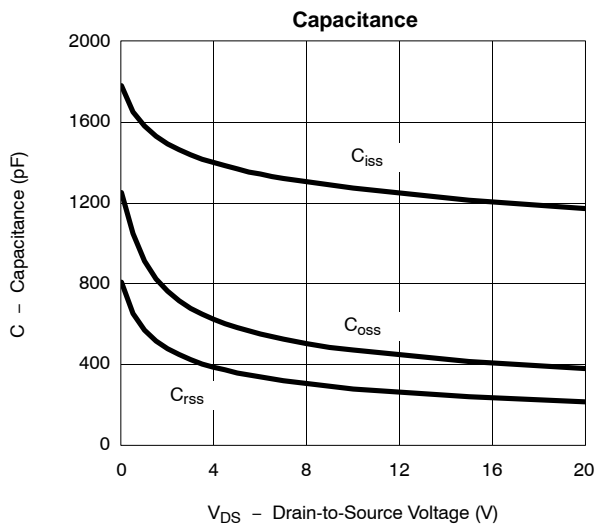
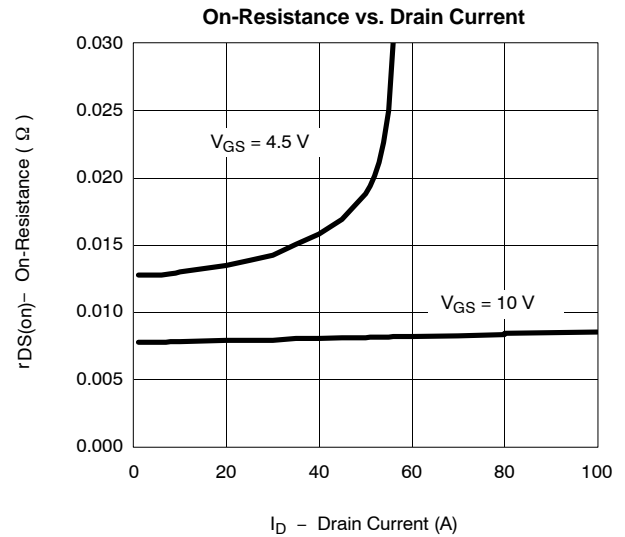
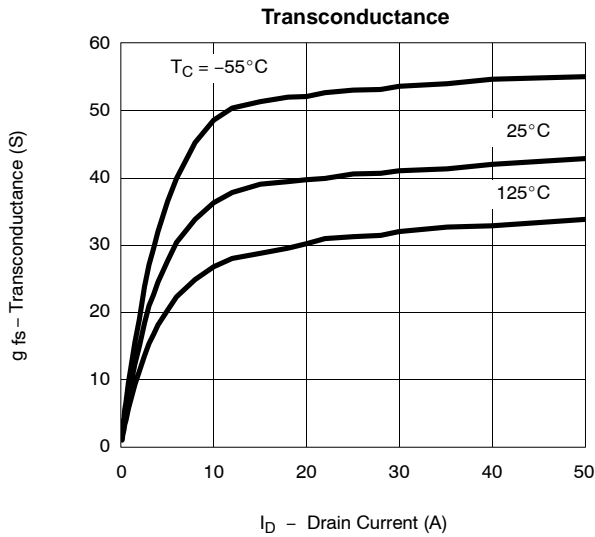
- Guaranteed by design, not subject to production testing.
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- Independent of operating temperature.

TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



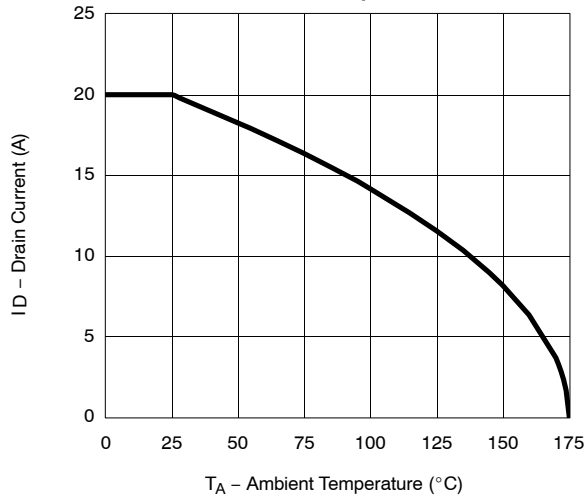


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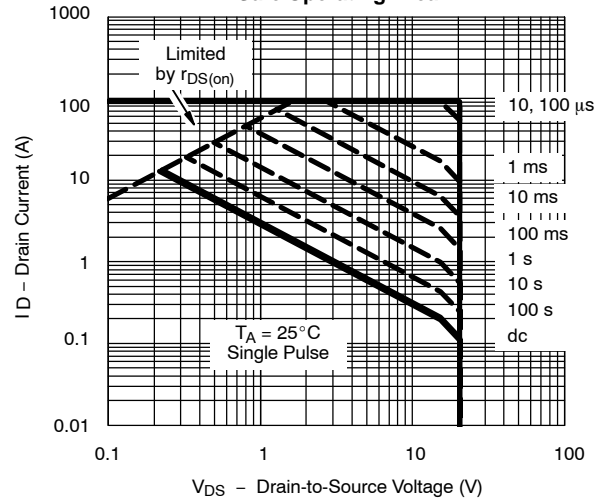


THERMAL RATINGS

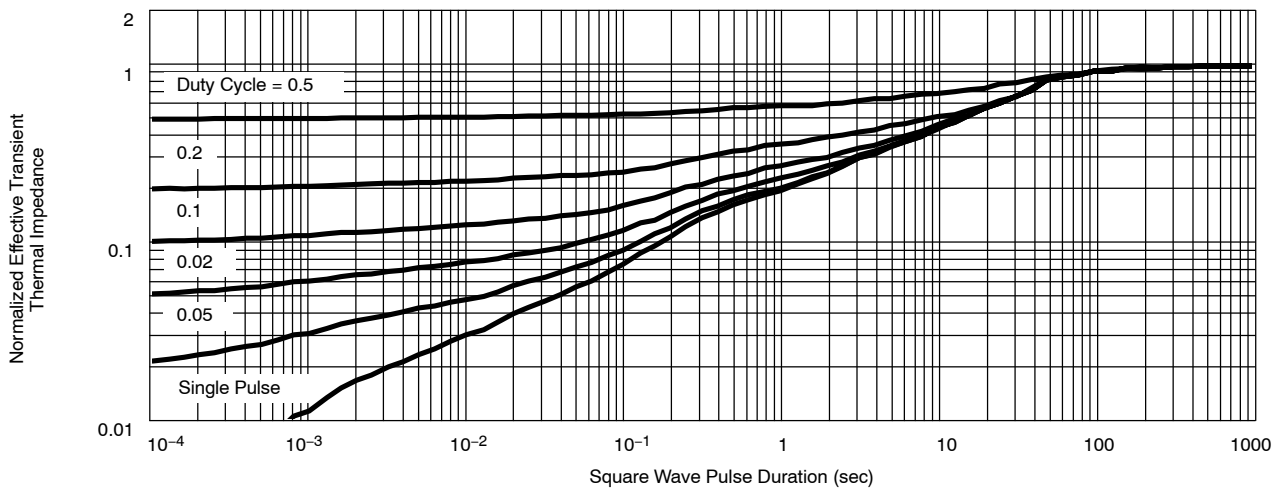
Maximum Drain Current vs. Ambient Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient





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