

N-Channel 20-V (D-S) 175°C MOSFET

PRODUCT SUMMARY

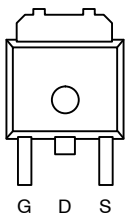
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^a
20	0.0095 @ $V_{GS} = 10$ V	20
	0.017 @ $V_{GS} = 4.5$ V	15

FEATURES

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

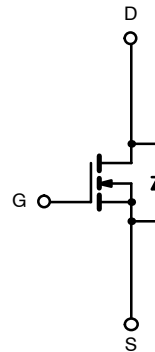
APPLICATIONS

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

TO-252


Top View

Drain Connected to Tab



N-Channel MOSFET

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

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ^a	I_D	$T_A = 25^\circ\text{C}$	20
		$T_C = 100^\circ\text{C}$	14
Pulsed Drain Current	I_{DM}	100	A
Continuous Source Current (Diode Conduction) ^a	I_S	4.3	
Avalanche Current	I_{AS}	L = 0.1 mH	29
Single Pulse Avalanche Energy			E_{AS}
Maximum Power Dissipation	P_D	$T_A = 25^\circ\text{C}$	6.5 ^a
		$T_C = 25^\circ\text{C}$	39.5
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 ^a	R_{thJA}	$t \leq 10$ sec	19	$^\circ\text{C}/\text{W}$
		Steady State	40	
Maximum Junction-to-Case	R_{thJC}	3.1	3.8	

Notes

- Surface Mounted on FR4 Board, $t \leq 10$ sec.
- Limited by package

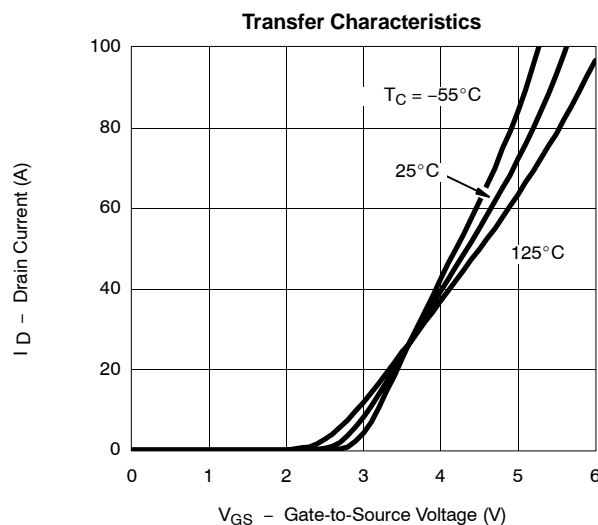
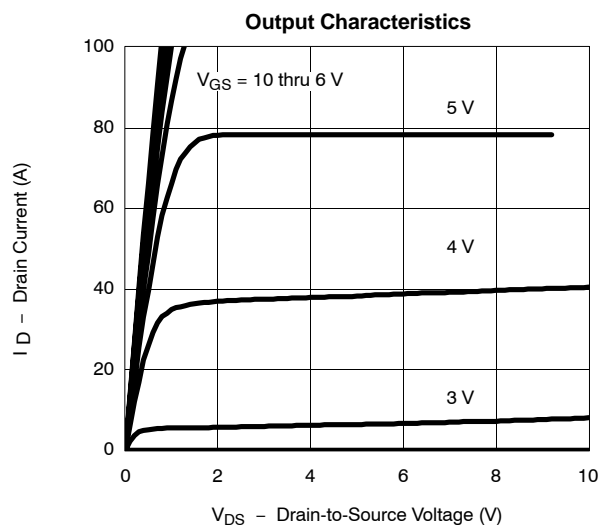
SPECIFICATIONS (T_J = 25 °C UNLESS OTHERWISE NOTED)

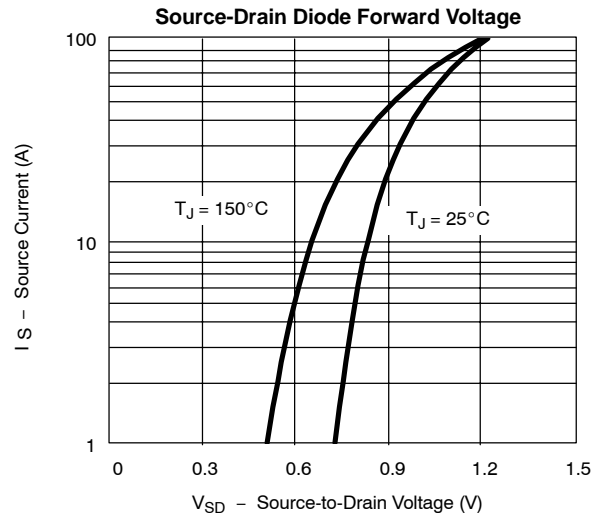
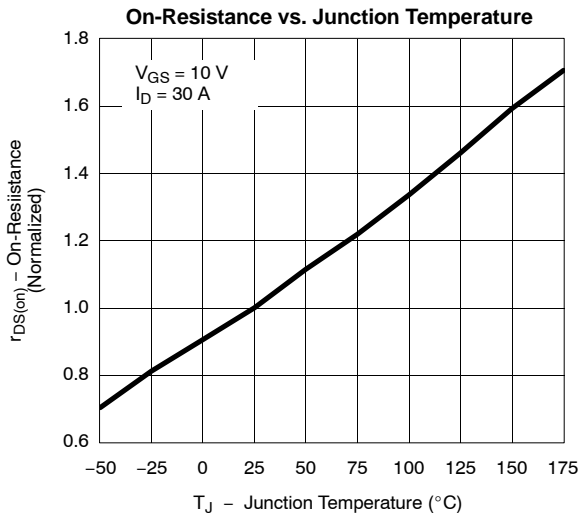
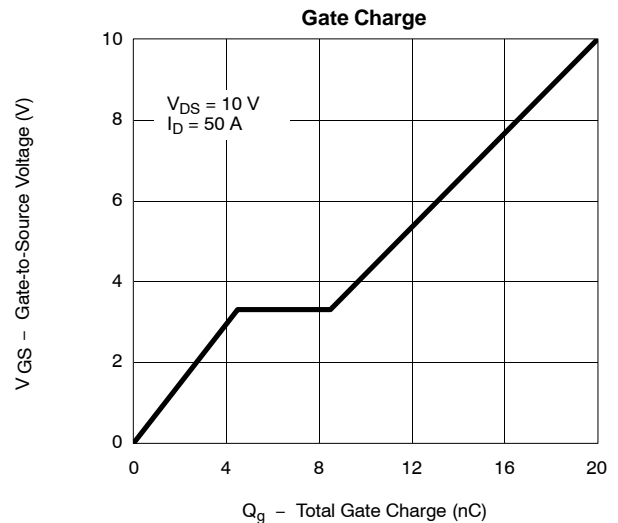
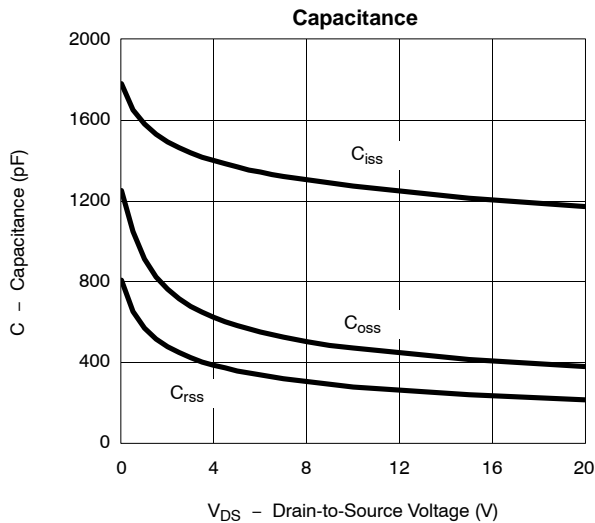
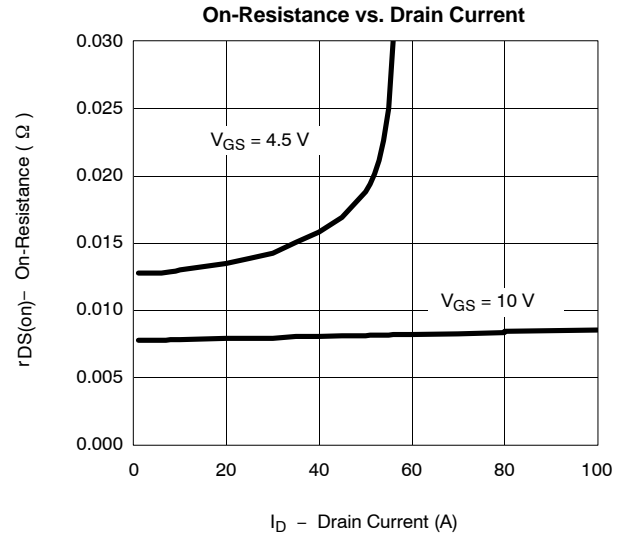
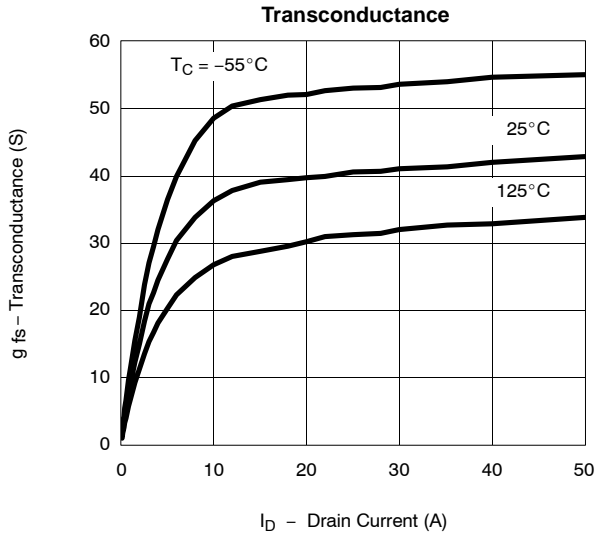
Parameter	Symbol	Test Condition	Min	Typ ^a	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	20			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.8		3.0	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA
Zero Gate 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.

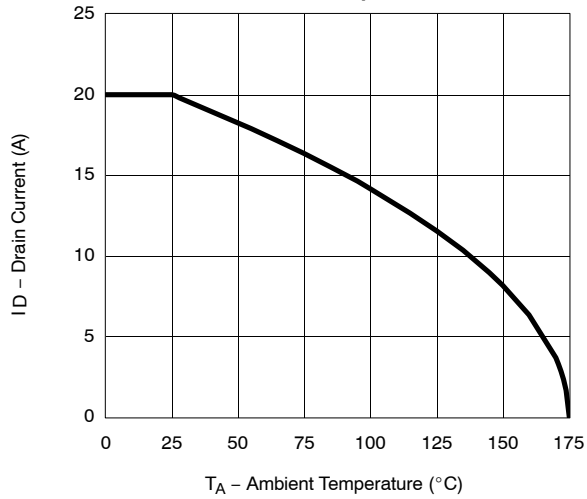
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



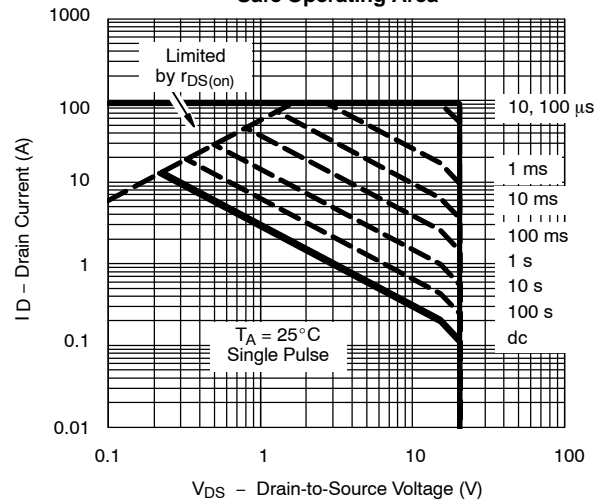
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)


THERMAL RATINGS

Maximum Drain Current vs. Ambient Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

