



## N-Channel 20-V (D-S) 175°C MOSFET

### PRODUCT SUMMARY

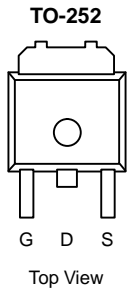
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>
20	0.011 @ $V_{GS} = 10$ V	18
	0.020 @ $V_{GS} = 4.5$ V	13.5

### FEATURES

- TrenchFET® Power MOSFET
- 175°C Junction Temperature
- PWM Optimized for High Efficiency

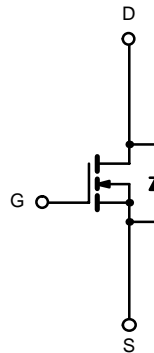
### APPLICATIONS

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



Drain Connected to Tab

Order Number:  
SUD50N02-11P



N-Channel MOSFET

### 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	$V_{GS}$	$\pm 20$		
Continuous Drain Current <sup>a</sup>	$I_D$	$T_A = 25^\circ\text{C}$	18	A
		$T_C = 100^\circ\text{C}$	13	
Pulsed Drain Current	$I_{DM}$	100		
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	4.1		
Maximum Power Dissipation	$P_D$	$T_A = 25^\circ\text{C}$	6.25	W
		$T_C = 25^\circ\text{C}$	38 <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>	$R_{thJA}$	$t \leq 10$ sec	19	$^\circ\text{C/W}$
		Steady State	40	
Maximum Junction-to-Case	$R_{thJC}$	3.2	3.9	

Notes

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

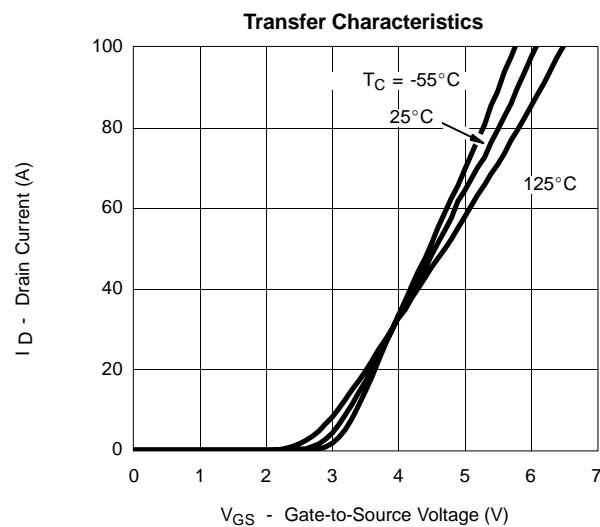
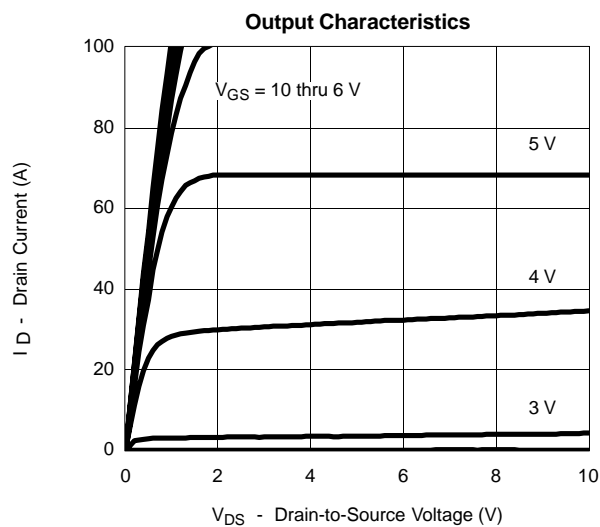
### SPECIFICATIONS ( $T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ <sup>a</sup>	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	20			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	0.8		3.0	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			50	
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	50			A
Drain-Source On-State Resistance <sup>b</sup>	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		0.0086	0.011	$\Omega$
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 125^\circ\text{C}$			0.0165	
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		0.016	0.020	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$	15			S
<b>Dynamic<sup>a</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 10\text{ V}, f = 1\text{ MHz}$		1190		pF
Output Capacitance	$C_{oss}$			435		
Reverse Transfer Capacitance	$C_{rss}$			190		
Gate Resistance	$R_G$			3.5		$\Omega$
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 50\text{ A}$		9.2	14	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			4		
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			3		
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 0.2\ \Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_G = 2.5\ \Omega$		11	20	ns
Rise Time <sup>c</sup>	$t_r$			10	15	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			30	45	
Fall Time <sup>c</sup>	$t_f$			9	15	
<b>Source-Drain Diode Ratings and Characteristic (<math>T_C = 25^\circ\text{C}</math>)</b>						
Pulsed Current	$I_{SM}$				100	A
Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$I_F = 50\text{ A}, V_{GS} = 0\text{ V}$		1.2	1.5	V
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		25	50	ns

#### Notes

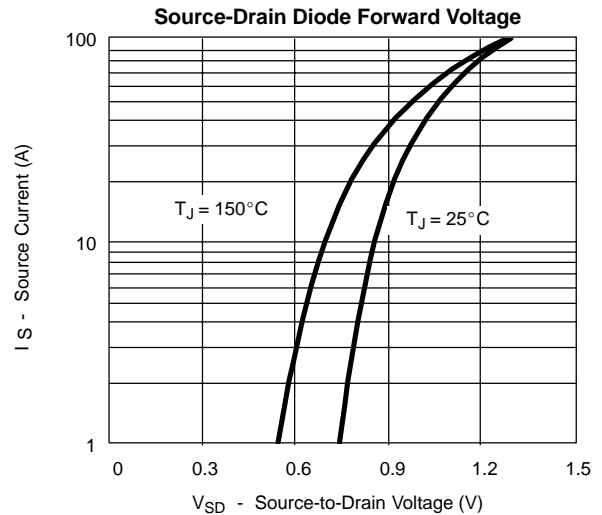
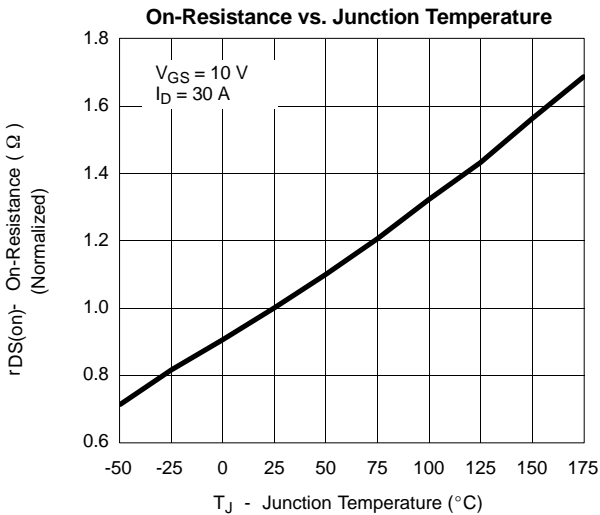
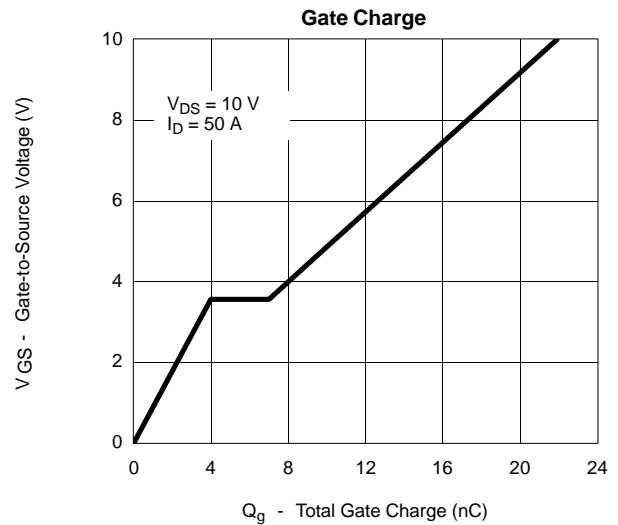
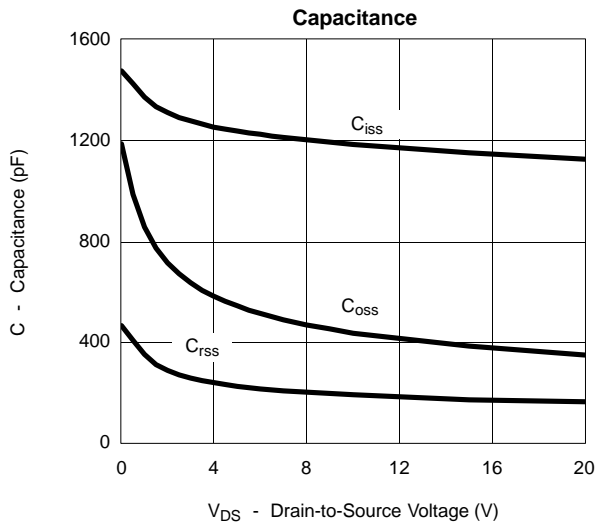
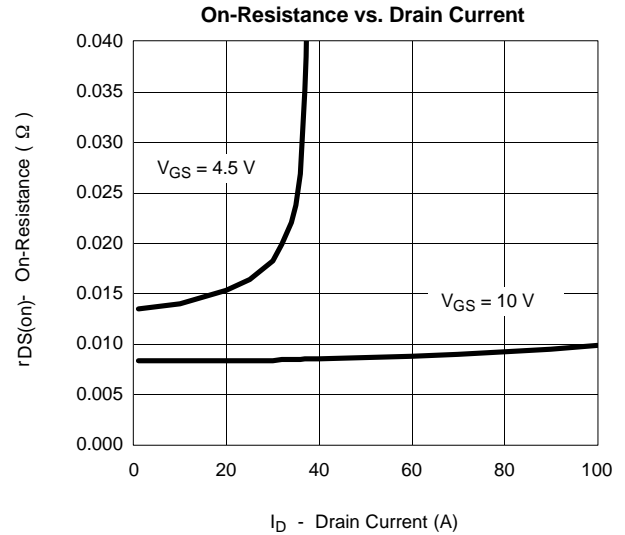
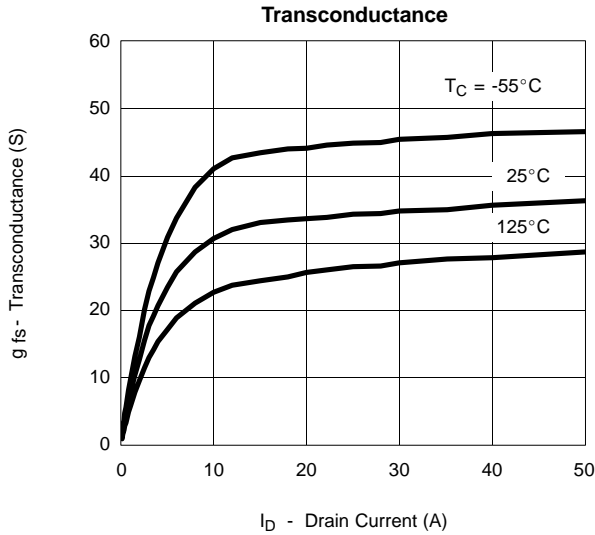
- Guaranteed by design, not subject to production testing.
- Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Independent of operating temperature.

### TYPICAL CHARACTERISTICS ( $25^\circ\text{C}$ UNLESS NOTED)





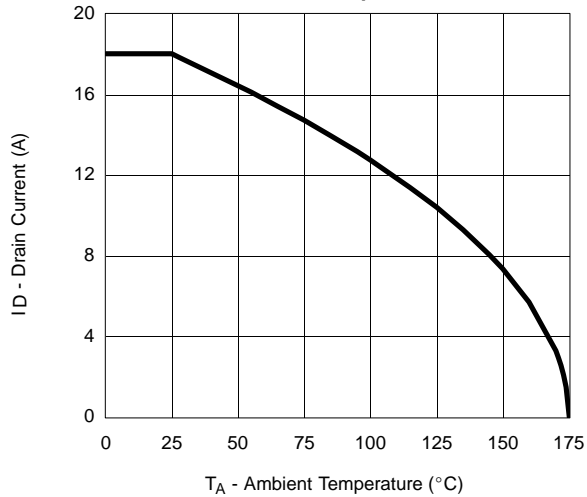
**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



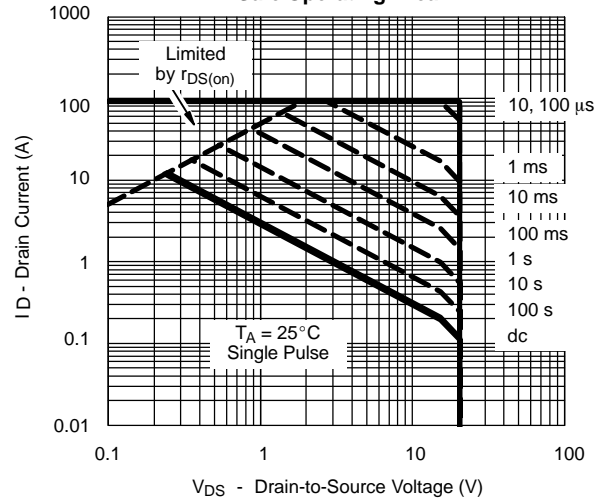


**THERMAL RATINGS**

Maximum Drain Current vs. Ambient Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

