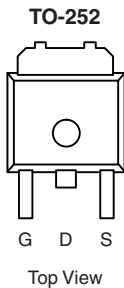


## N-Channel 30-V (D-S) 175 °C MOSFET

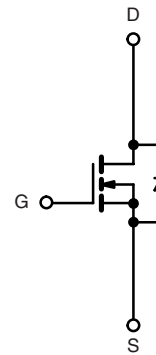
PRODUCT SUMMARY		
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>
30	0.011 at $V_{GS} = 10$ V	50
	0.017 at $V_{GS} = 4.5$ V	43

**FEATURES**

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


**RoHS**  
COMPLIANT


Drain Connected to Tab

**Ordering Information:** SUD50N03-11-E3 (Lead (Pb)-free)


N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °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 ( $T_J = 175$ °C) <sup>b</sup>	$I_D$	$T_C = 25$ °C	A	
		$T_C = 100$ °C		37
Pulsed Drain Current	$I_{DM}$	100	A	
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	50		
Maximum Power Dissipation	$P_D$	$T_C = 25$ °C	62.5 <sup>c</sup>	W
		$T_A = 25$ °C	7.5 <sup>b</sup>	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 175	°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Junction-to-Ambient <sup>b</sup>	$R_{thJA}$	$t \leq 10$ s	17	20	°C/W
		Steady State	50	60	
Junction-to-Case	$R_{thJC}$	2	2.4		
Junction-to-Lead	$R_{thJL}$	4	4.8		

Notes:

- Package limited.
- Surface Mounted on 1" x 1" FR4 board,  $t \leq 10$  s.
- See SOA curve for voltage derating.

\* Pb containing terminations are not RoHS compliant, exemptions may apply.

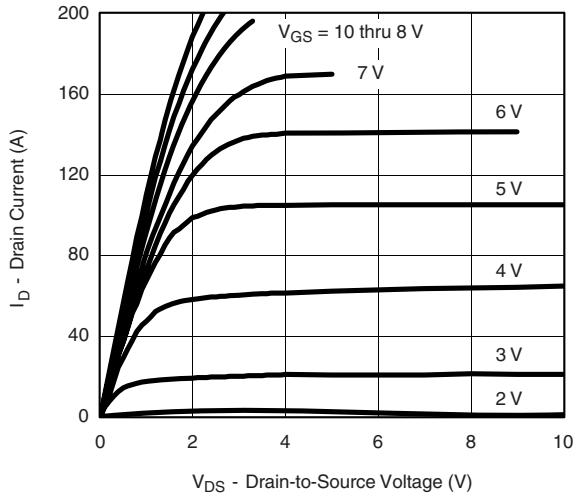
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ. <sup>a</sup>	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.8			
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	$\mu\text{A}$
		$V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 5\text{ V}$	50			A
Drain-Source On-State Resistance <sup>b</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 25\text{ A}$		0.009	0.011	$\Omega$
		$V_{GS} = 5\text{ V}, I_D = 20\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.018	
		$V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$		0.014	0.017	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$	10			S
<b>Dynamic<sup>a</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		1130		pF
Output Capacitance	$C_{oss}$			400		
Reverse Transfer Capacitance	$C_{rss}$			175		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 15\text{ V}, V_{GS} = 5\text{ V}, I_D = 50\text{ A}$		12	20	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			4		
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			4.5		
Gate Resistance	$R_g$		0.5		3.4	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 0.3\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_G = 2.5\text{ }\Omega$		8	12	ns
Rise Time <sup>c</sup>	$t_r$			10	15	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			18	30	
Fall Time <sup>c</sup>	$t_f$			6	9	
<b>Source-Drain Diode Ratings and Characteristics</b> $T_C = 25\text{ }^\circ\text{C}$						
Continuous Current	$I_S$				50	A
Pulsed Current	$I_{SM}$				80	
Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$I_F = 100\text{ A}, V_{GS} = 0\text{ V}$			1.5	V
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		30	50	ns

## Notes:

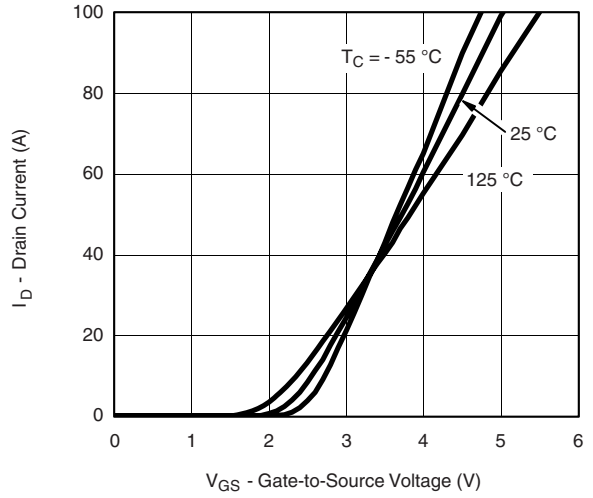
- Guaranteed by design, not subject to production testing.
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

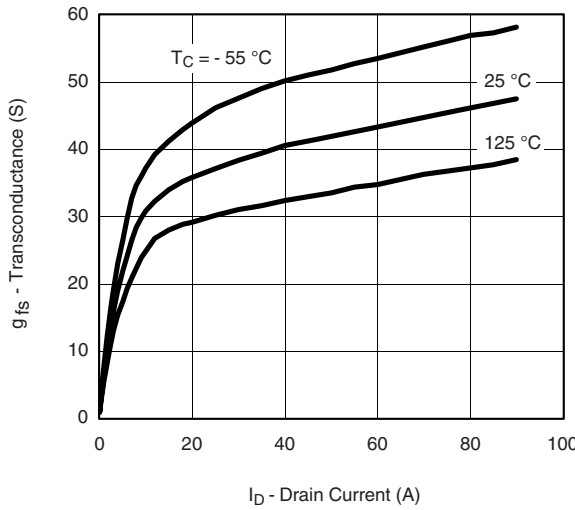
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



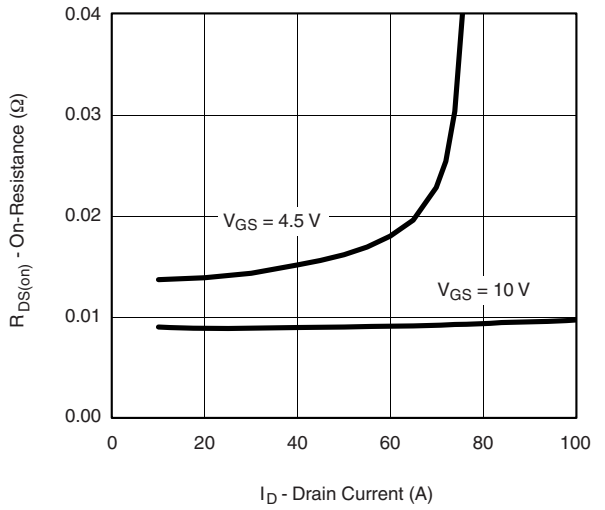
**Output Characteristics**



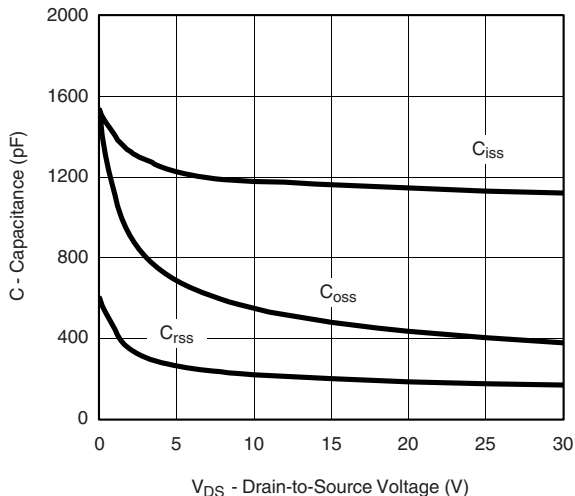
**Transfer Characteristics**



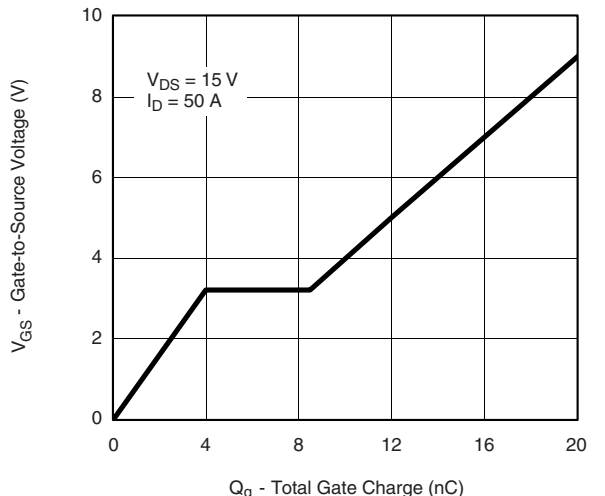
**Transconductance**



**On-Resistance vs. Drain Current**

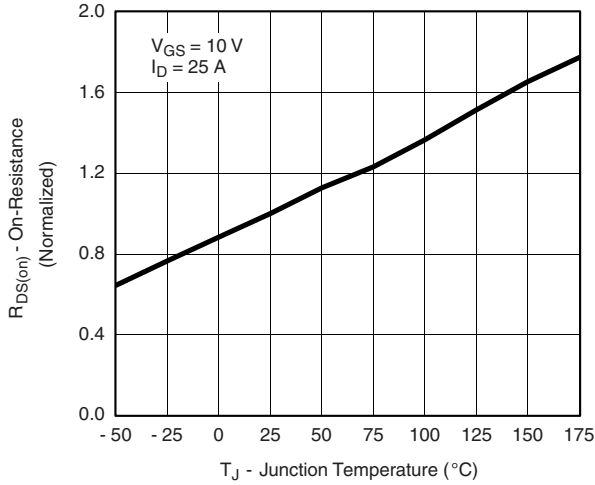


**Capacitance**

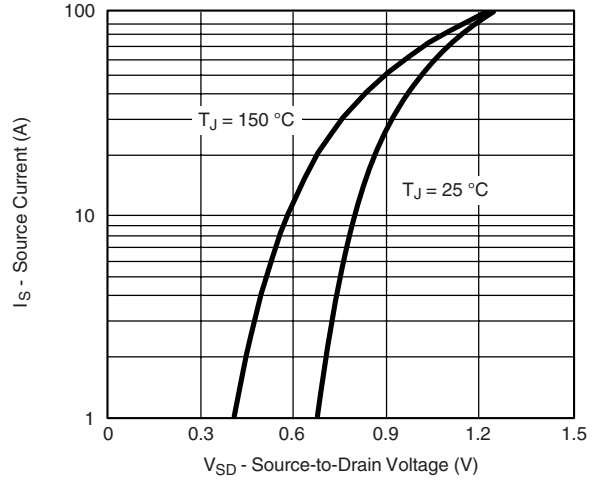


**Gate Charge**

### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

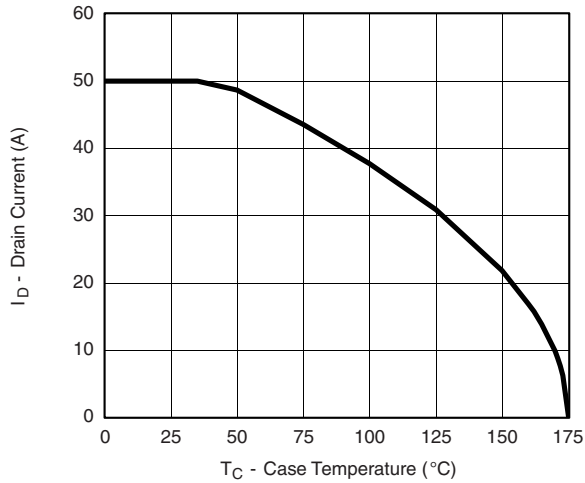


On-Resistance vs. Junction Temperature

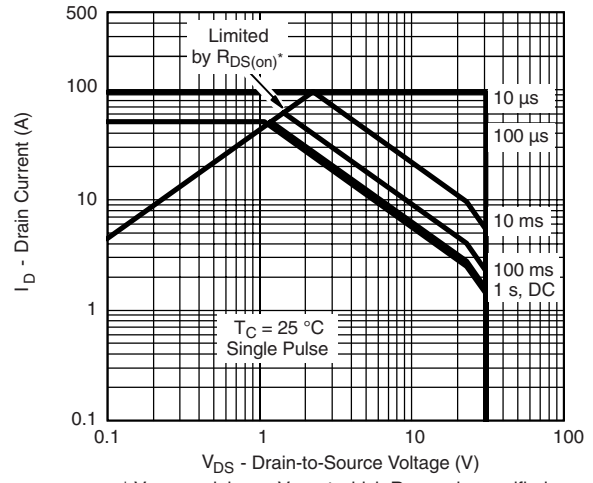


Source-Drain Diode Forward Voltage

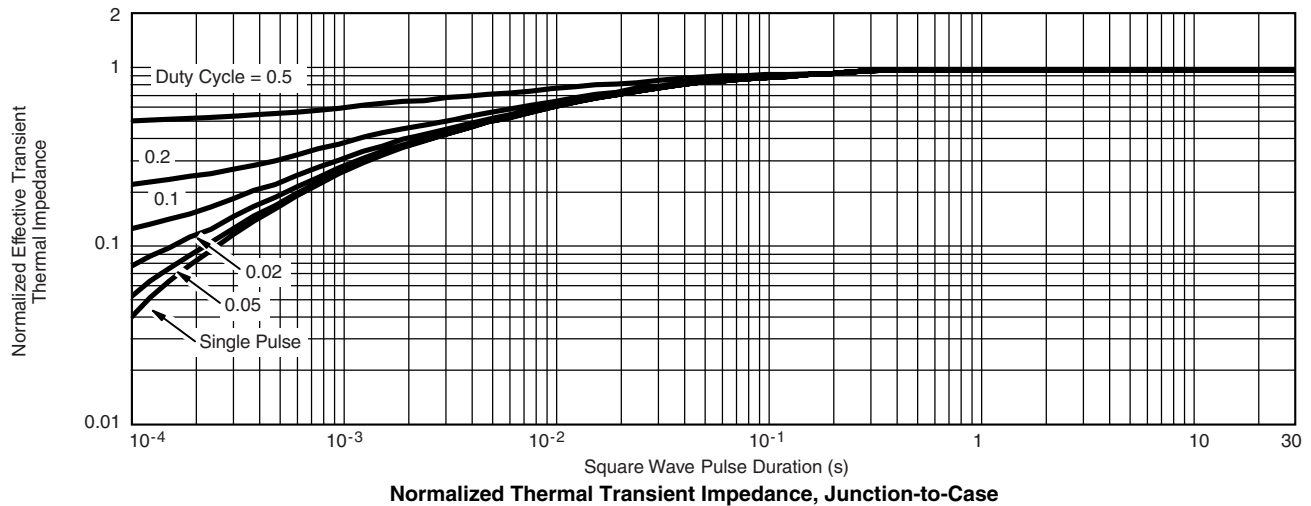
### THERMAL RATINGS



Maximum Avalanche Drain Current vs. Case Temperature



Safe Operating Area  
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified



Normalized Thermal Transient Impedance, Junction-to-Case

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