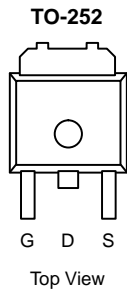




## N-Channel 30-V (D-S) 175°C MOSFET

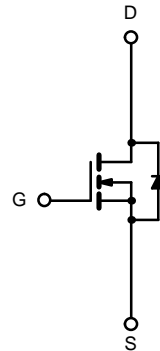
PRODUCT SUMMARY		
V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a</sup>
30	0.011 @ V <sub>GS</sub> = 10 V	50
	0.017 @ V <sub>GS</sub> = 4.5 V	43

**175°C Rated**  
Maximum Junction Temperature  
**TrenchFET<sup>®</sup>**  
Power MOSFETs



Order Number:  
SUD50N03-11

Drain Connected to Tab



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	30	V
Gate-Source Voltage	V <sub>GS</sub>	±20	
Continuous Drain Current (T <sub>J</sub> = 175°C) <sup>b</sup>	I <sub>D</sub>	T <sub>C</sub> = 25°C	A
		T <sub>C</sub> = 100°C	
Pulsed Drain Current	I <sub>DM</sub>	100	A
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	50	
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25°C	W
		T <sub>A</sub> = 25°C	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Junction-to-Ambient <sup>b</sup>	R <sub>thJA</sub>	t ≤ 10 sec	17	20	°C/W
		Steady State	50	60	
Junction-to-Case	R <sub>thJC</sub>	2	2.4	°C/W	
Junction-to-Lead	R <sub>thJL</sub>	4	4.8	°C/W	

Notes

- a. Package Limited.
- b. Surface Mounted on 1" x 1" FR4 Board, t ≤ 10 sec.
- c. See SOA curve for voltage derating.



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	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	30			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	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	$\mu\text{A}$
		$V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			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	$\Omega$
		$V_{GS} = 5\text{ V}, I_D = 20\text{ A}, T_J = 125^\circ\text{C}$			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		$\mu\text{F}$
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		
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 0.3\ \Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_G = 2.5\ \Omega$		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 Characteristic (<math>T_C = 25^\circ\text{C}</math>)</b>						
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

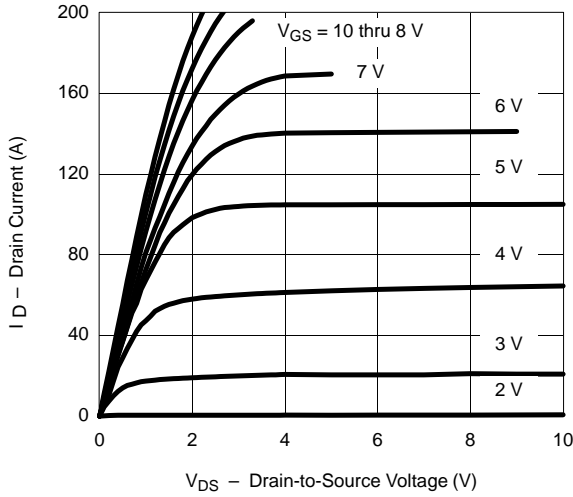
## Notes

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

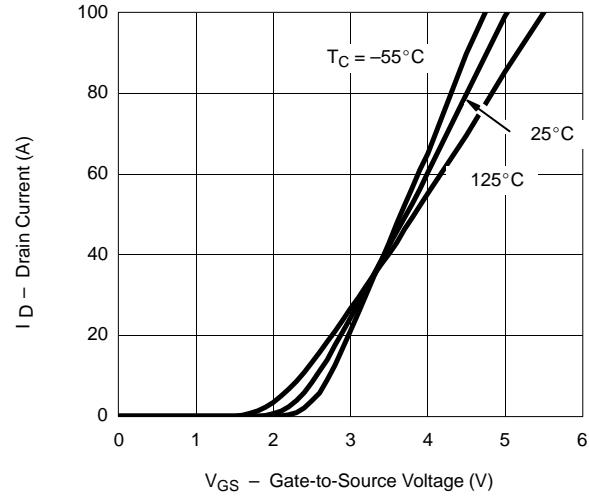


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

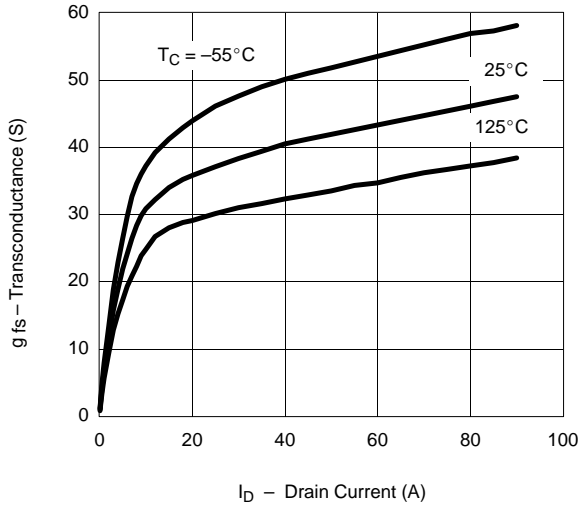
**Output Characteristics**



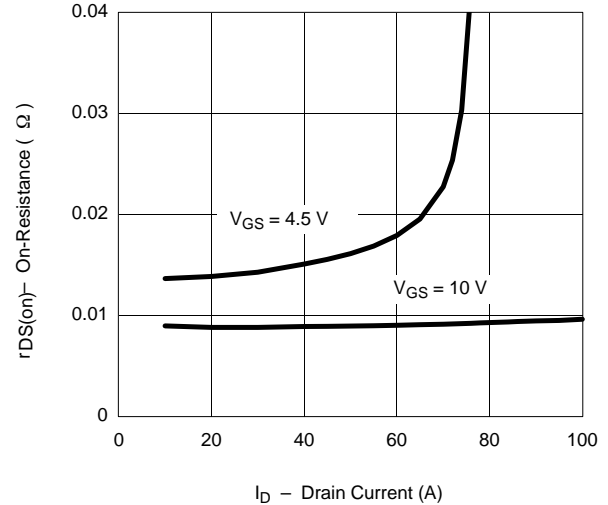
**Transfer Characteristics**



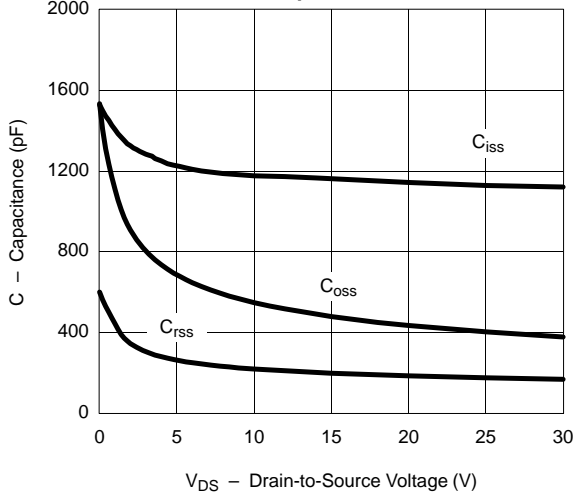
**Transconductance**



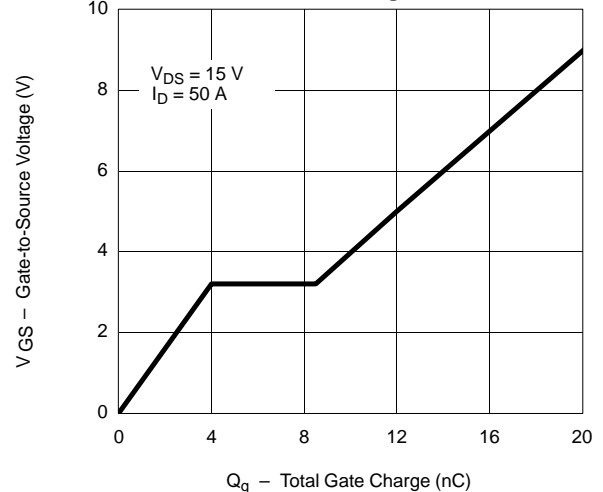
**On-Resistance vs. Drain Current**



**Capacitance**



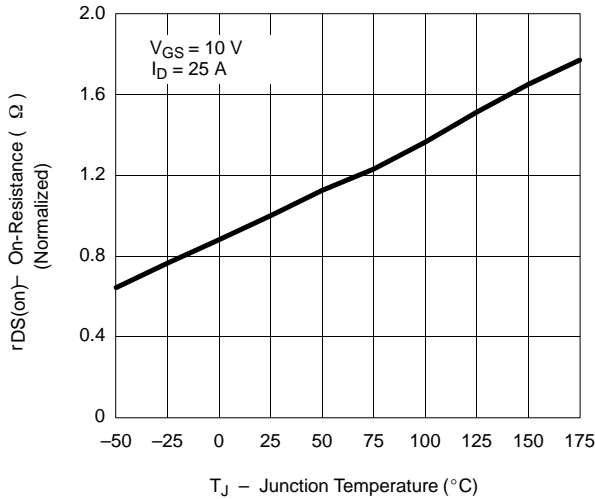
**Gate Charge**



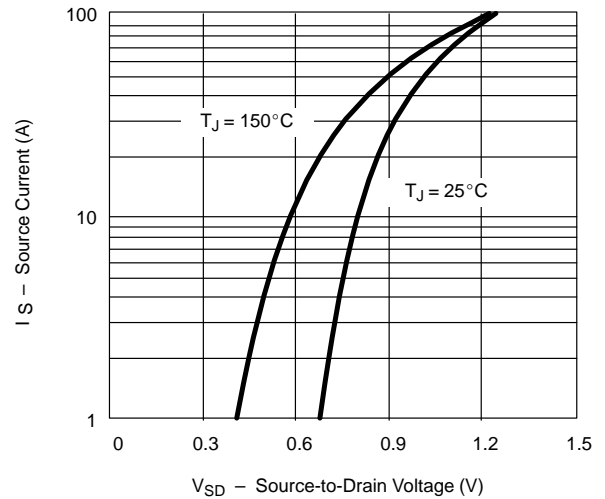


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

On-Resistance vs. Junction Temperature

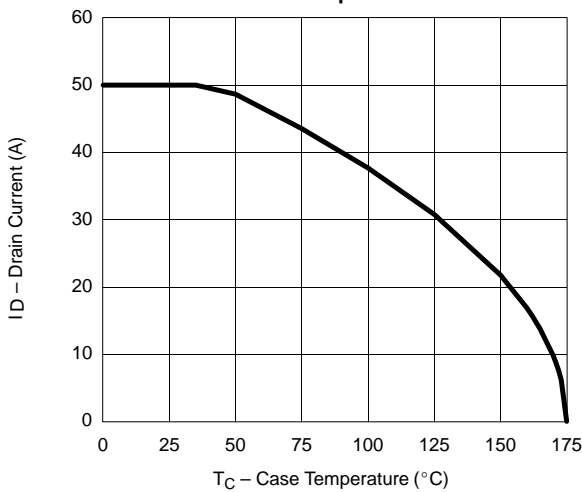


Source-Drain Diode Forward Voltage

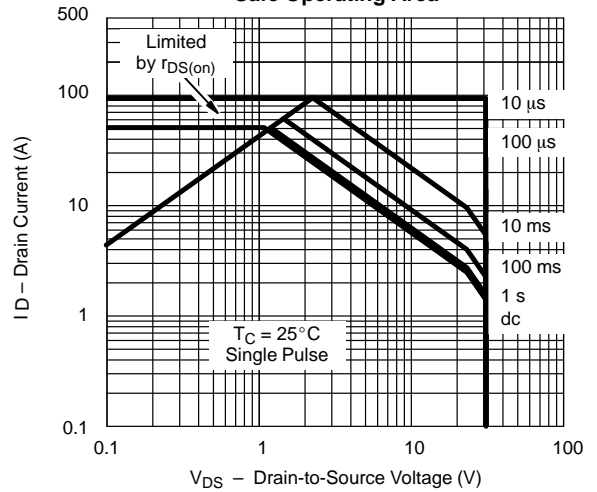


**THERMAL RATINGS**

Maximum Avalanche Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

