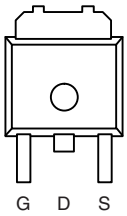
N-Channel 30-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]
30	0.011 at V_{GS} = 10 V	50
	0.017 at V_{GS} = 4.5 V	43

FEATURES

- TrenchFET® Power MOSFET
- 175 °C Maximum Junction Temperature
- 100 % R_g Tested

RoHS COMPLIANT

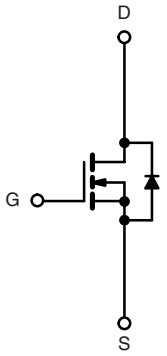


TO-252

Top View

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}	± 20	
Continuous Drain Current (T_J = 175 °C)[b]	T_C = 25 °C	I_D	50	A
	T_C = 100 °C		37	
Pulsed Drain Current		I_{DM}	100	
Continuous Source Current (Diode Conduction)[a]		I_S	50	
Maximum Power Dissipation	T_C = 25 °C	P_D	62.5[c]	W
	T_A = 25 °C		7.5[b]	
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[b]	t ≤ 10 s	R_{thJA}	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:
a. Package limited.
b. Surface Mounted on 1" x 1" FR4 board, t ≤ 10 s.
c. See SOA curve for voltage derating.

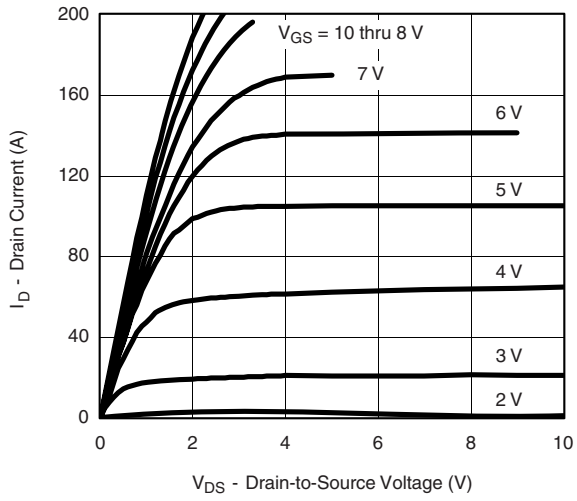
* Pb containing terminations are not RoHS compliant, exemptions may apply.

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

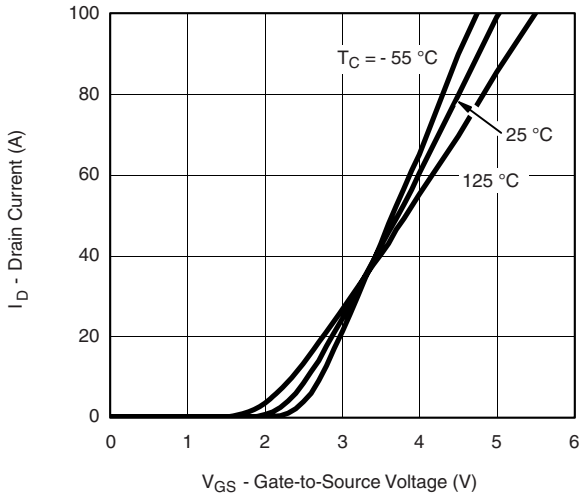
Notes:
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
c. Independent of operating temperature.

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.

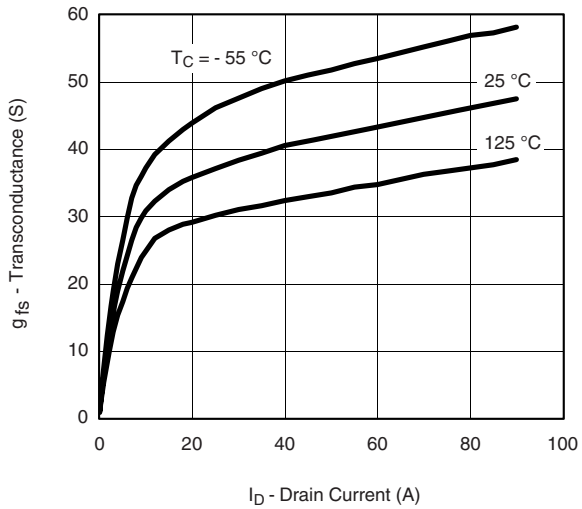
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



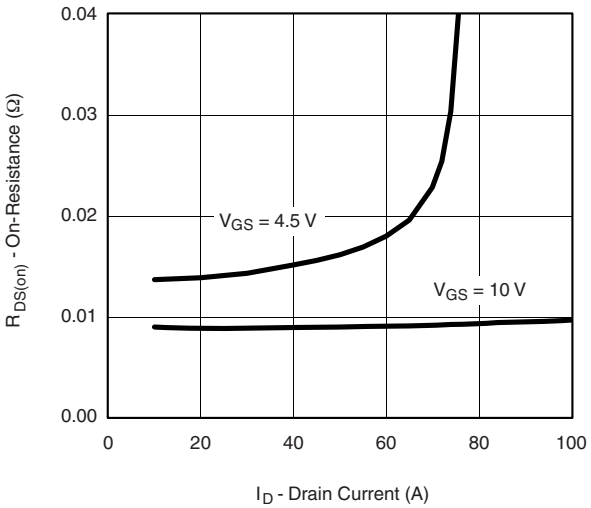
Output Characteristics



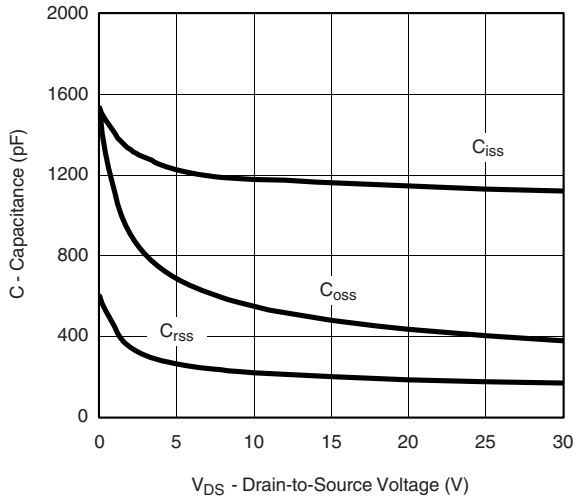
Transfer Characteristics



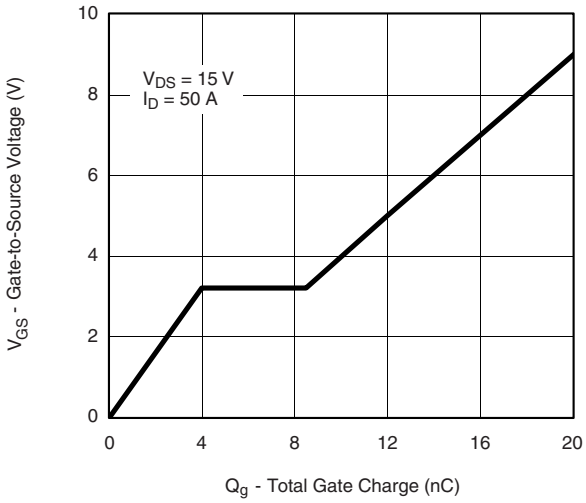
Transconductance



On-Resistance vs. Drain Current

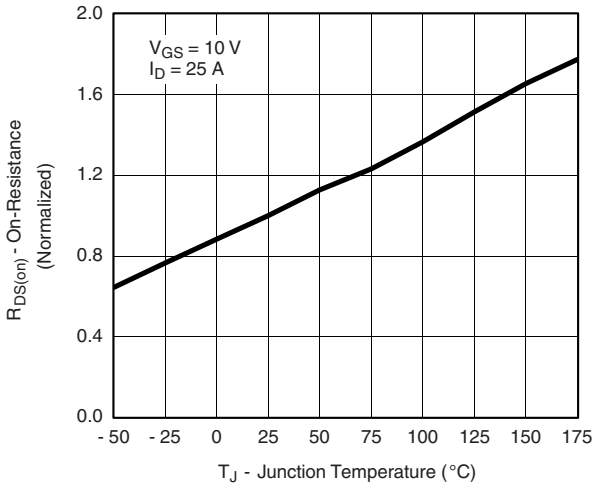


Capacitance

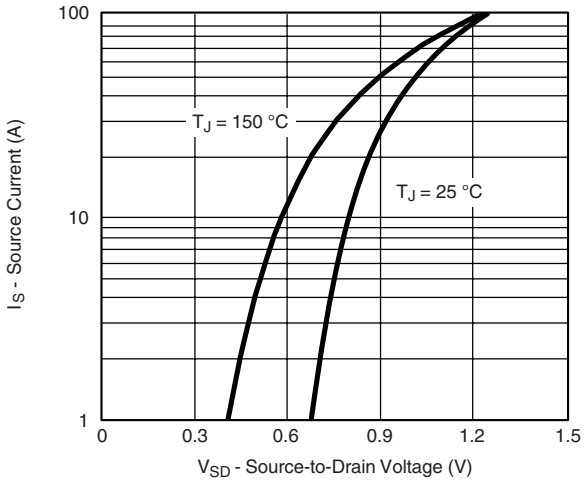


Gate Charge

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

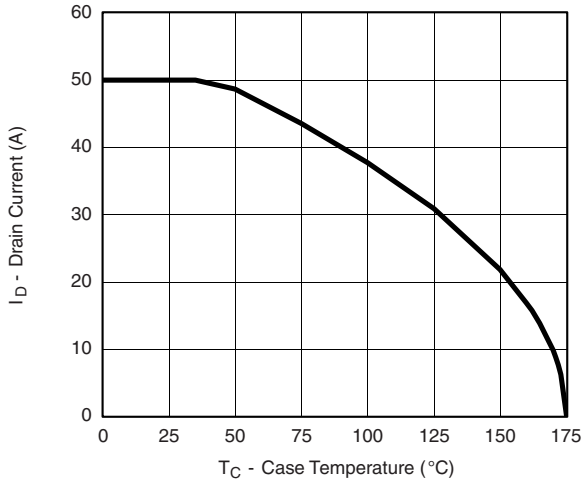


On-Resistance vs. Junction Temperature

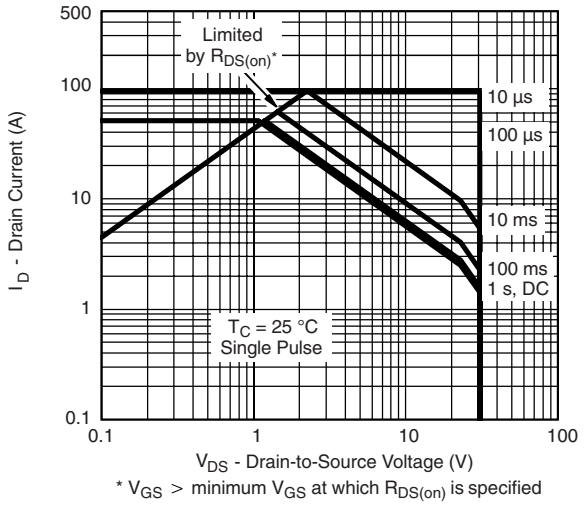


Source-Drain Diode Forward Voltage

THERMAL RATINGS

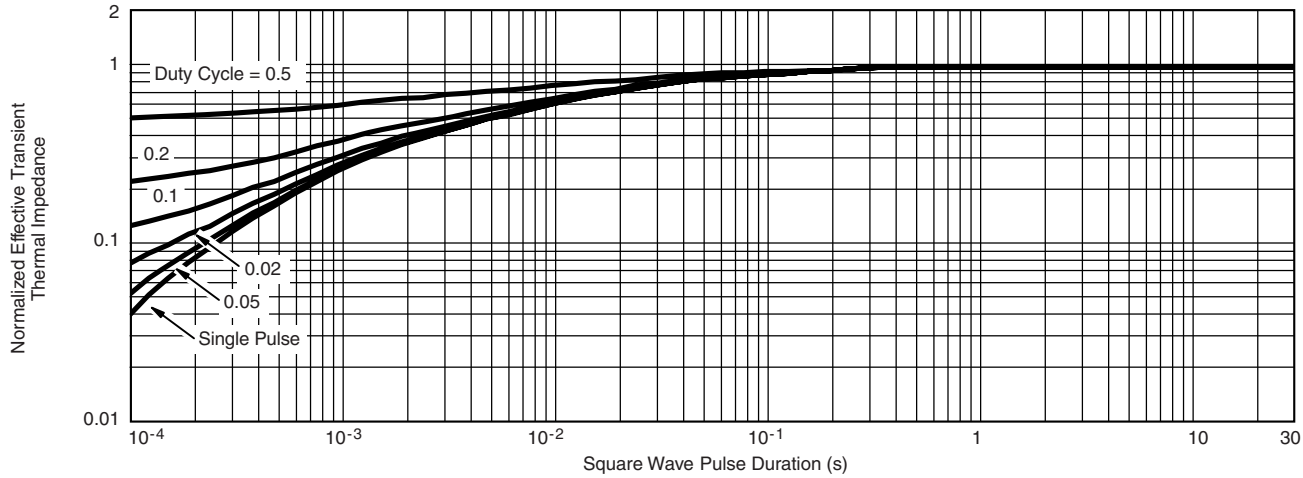


Maximum Avalanche Drain Current vs. Case Temperature



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

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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