N-Channel 60-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)[c]	Q_g (Typ)
60	0.0078 @ V_{GS} = 10 V	93	94

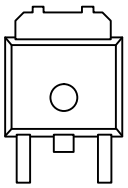
FEATURES

- TrenchFET® Power MOSFET
- 175 °C Junction Temperature
- 100% R_g Tested
- High Threshold at High Temperature

APPLICATIONS

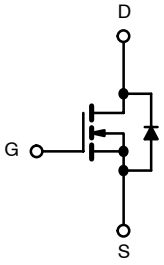
- Automotive Such As:
  - High-Side Switch
  - Motor Drives
  - 12-V Battery

TO-252



Top View

Drain Connected to Tab



N-Channel MOSFET

Ordering Information: SUD50N06-08H—E3

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current (T_J = 175°C)[b]	T_C = 25°C	I_D	93[c]	A
	T_C = 125°C		54[c]	
Pulsed Drain Current		I_{DM}	100	
Continuous Source Current (Diode Conduction)		I_S	91[c]	
Avalanche Current, Single Pulse		I_{AS}	50	
Avalanche Energy	L = 0.1 mH	E_{AS}	125	mJ
Maximum Power Dissipation	T_C = 25°C	P_D	136[b]	W
	T_A = 25°C		3[a]	
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[a]	t ≤ 10 sec	R_{thJA}	15	18	°C/W
	Steady State		40	50	
Junction-to-Case		R_{thJC}	0.85	1.1	

Notes
a. Surface Mounted on 1" x1" FR4 Board.
b. See SOA curve for voltage derating.
c. Calculate continuous current based on maximum allowable junction temperature when using infinite heat sink. Package limitation current is 50 A.

SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

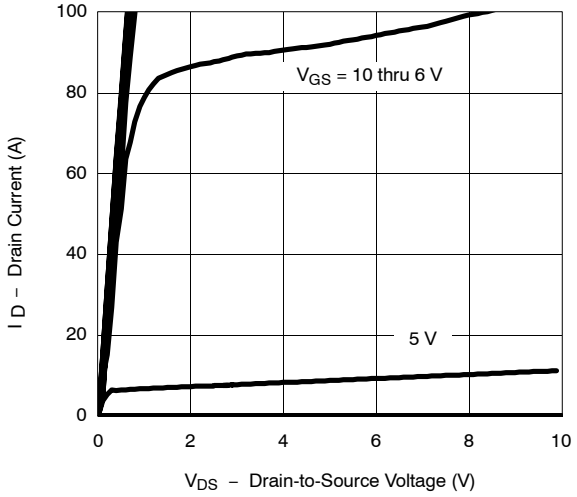
Parameter	Symbol	Test Condition	Min	Typ[a]	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA	60			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	3.4		4.5	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 60 V, V_{GS} = 0 V			1	μA
		V_{DS} = 60 V, V_{GS} = 0 V, T_J = 125°C			50	
		V_{DS} = 60 V, V_{GS} = 0 V, T_J = 175°C			250	
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		0.0065	0.0078	Ω
		V_{GS} = 10 V, I_D = 20 A, T_J = 125°C			0.013	
		V_{GS} = 10 V, I_D = 20 A, T_J = 175°C			0.0156	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 20 A		25		S
Dynamic[a]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, F = 1 MHz		7000		pF
Output Capacitance	C_{oss}			450		
Reverse Transfer Capacitance	C_{rss}			240		
Gate Resistance	R_g	f = 1 MHz	0.75	1.5	2.3	Ω
Total Gate Charge[c]	Q_g	V_{DS} = 30 V, V_{GS} = 10 V, I_D = 50 A		94	145	nC
Gate-Source Charge[c]	Q_{gs}			35		
Gate-Drain Charge[c]	Q_{gd}			20		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 30 V, R_L = 0.6 Ω I_D ≅ 50 A, V_{GEN} = 10 V, R_g = 2.5 Ω		28	45	ns
Rise Time[c]	t_r			13	20	
Turn-Off Delay Time[c]	$t_{d(off)}$			50	75	
Fall Time[c]	t_f			10	15	
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		1.0	1.5	V
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 50 A, di/dt = 100 A/μs		45	70	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.

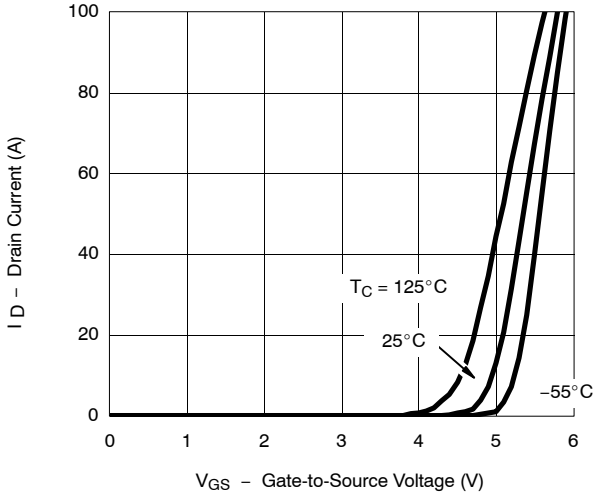
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

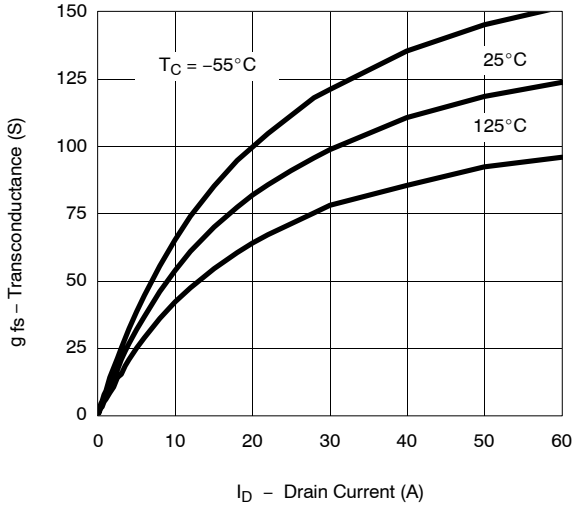
Output Characteristics



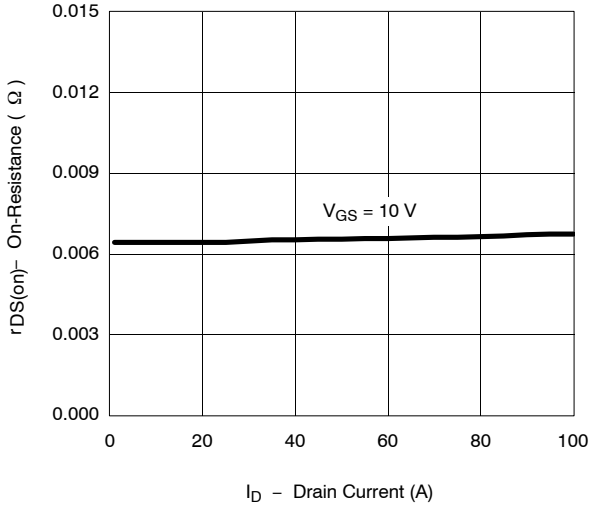
Transfer Characteristics



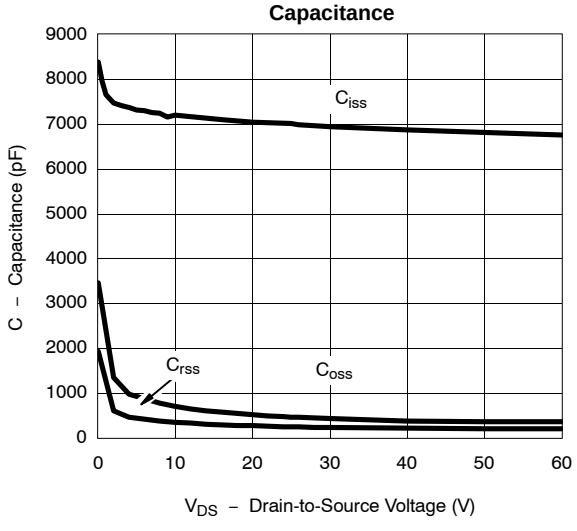
Transconductance



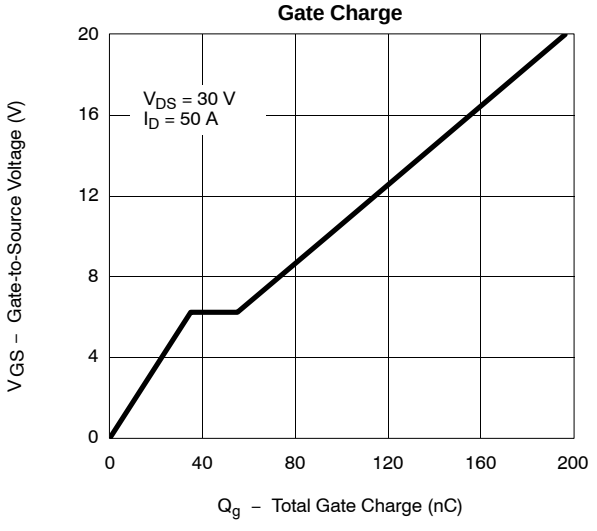
On-Resistance vs. Drain Current



Capacitance

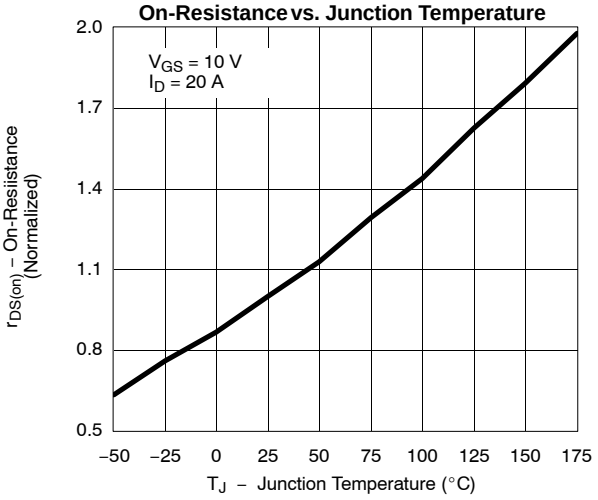


Gate Charge

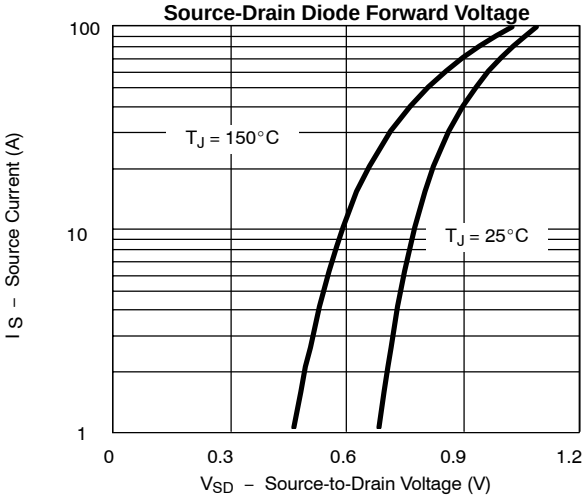


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

On-Resistance vs. Junction Temperature

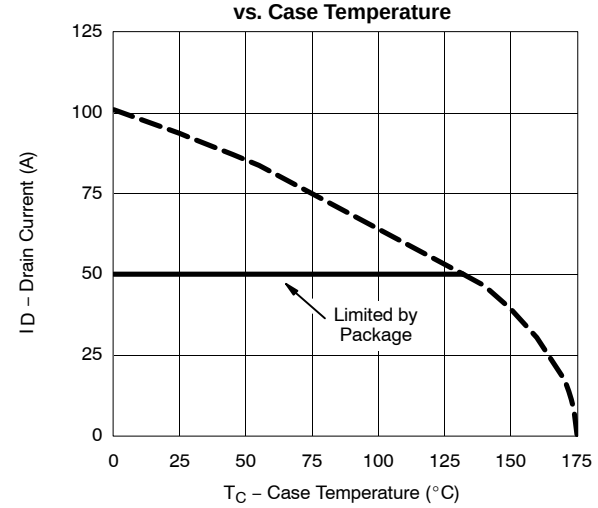


Source-Drain Diode Forward Voltage

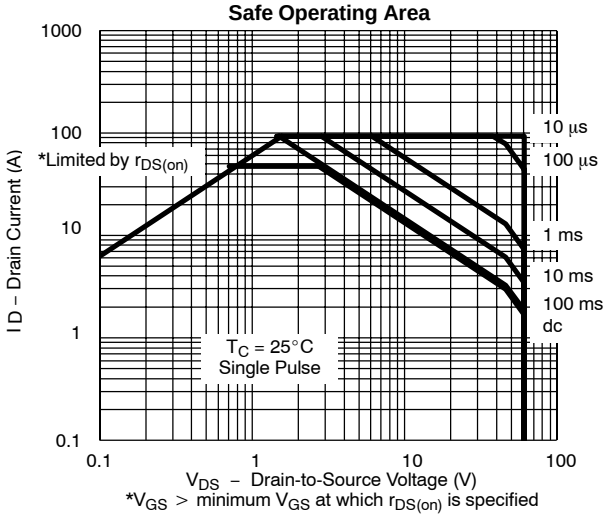


THERMAL RATINGS

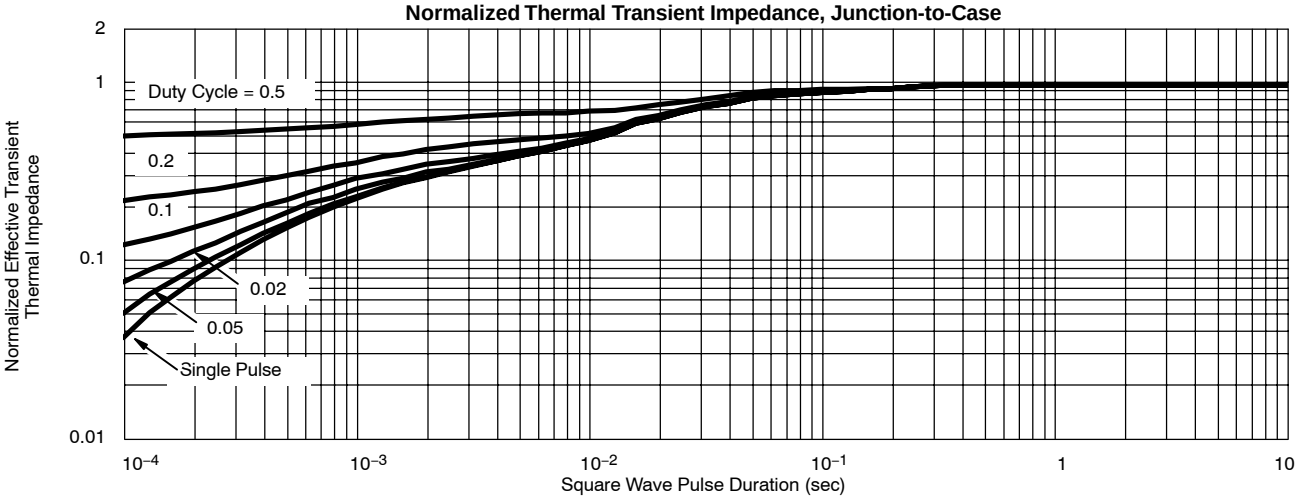
Maximum Avalanche Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case



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