

N-Channel 200 V (D-S) 175 °C MOSFET

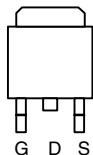
PRODUCT SUMMARY

V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)
200	0.270 at V _{GS} = 10 V	9
	0.300 at V _{GS} = 6 V	8.5

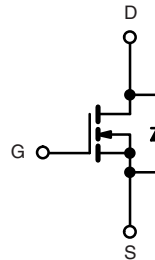
FEATURES

- TrenchFET® Power MOSFETS
- 175 °C Junction Temperature
- Low Thermal Resistance Package
- Compliant to RoHS Directive 2002/95/EC


RoHS
COMPLIANT

TO-263


Top View

Ordering Information: SUM09N20-270-E3 (Lead (Pb) free)


N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	200	V
Gate-Source Voltage	V _{GS}	± 20	
Continuous Drain Current (T _J = 175 °C)	I _D	T _C = 25 °C	9
		T _C = 125 °C	5.2
Pulsed Drain Current	I _{DM}	10	A
Avalanche Current	I _{AR}	7	
Repetitive Avalanche Energy ^a	E _{AR}	2.45	mJ
Maximum Power Dissipation ^a	P _D	T _C = 25 °C	60 ^b
		T _A = 25 °C ^c	3.75
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient (PCB Mount) ^c	R _{thJA}	40	°C/W
Junction-to-Case (Drain)	R _{thJC}	2.5	

Notes:

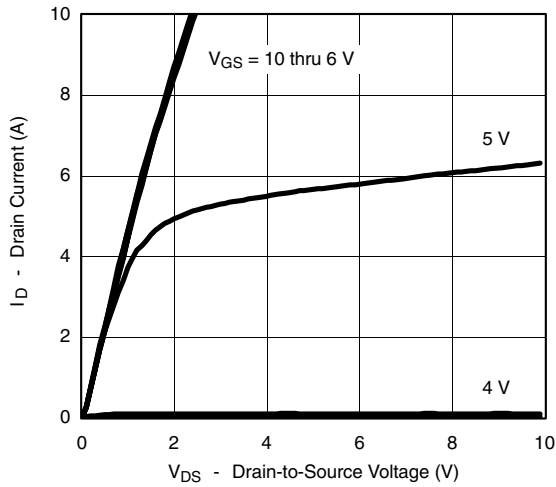
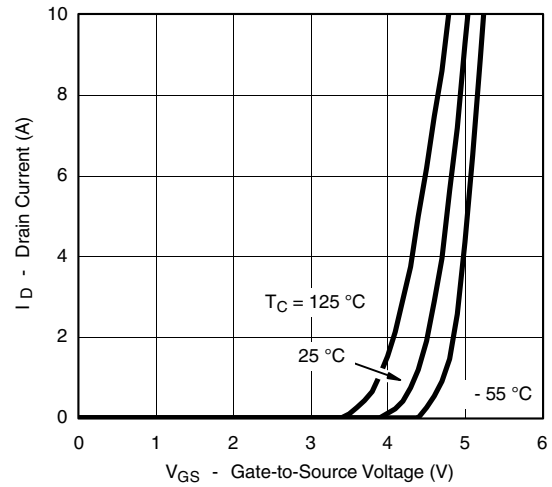
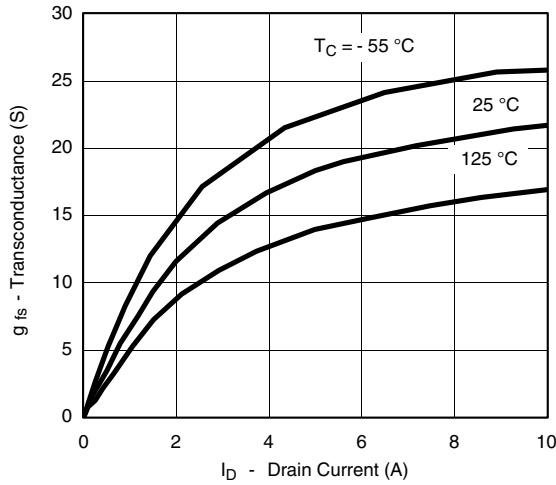
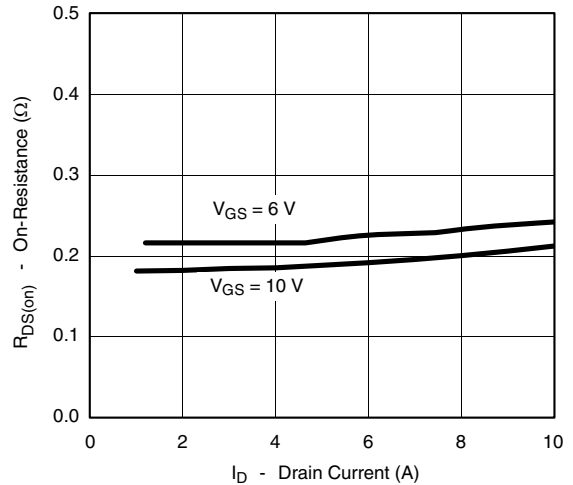
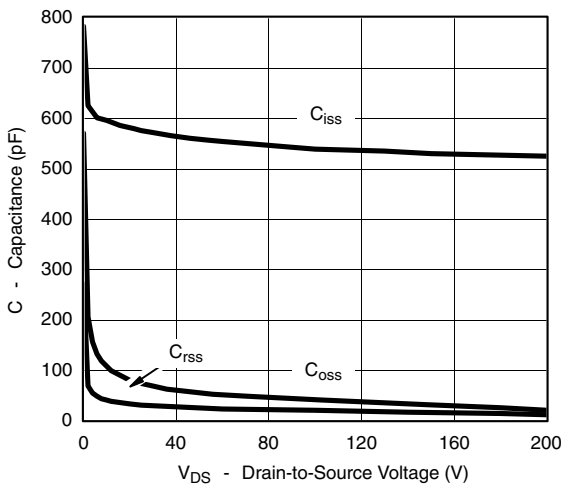
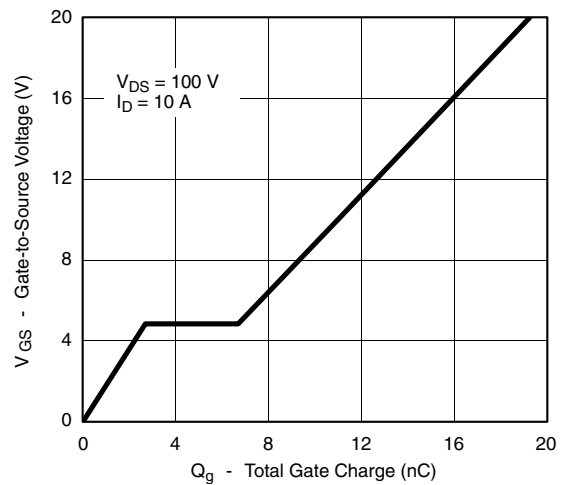
- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{DS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	200			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2		4	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 160\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 160\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 160\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 175\text{ }^\circ\text{C}$			250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}$, $V_{GS} = 10\text{ V}$	10			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 5\text{ A}$		0.216	0.270	Ω
		$V_{GS} = 10\text{ V}$, $I_D = 5\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$			0.54	
		$V_{GS} = 10\text{ V}$, $I_D = 5\text{ A}$, $T_J = 175\text{ }^\circ\text{C}$			0.71	
		$V_{GS} = 6\text{ V}$, $I_D = 5\text{ A}$		0.240	0.300	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 5\text{ A}$		15		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$		580		μF
Output Capacitance	C_{oss}			75		
Reverse Transfer Capacitance	C_{rss}			30		
Total Gate Charge ^c	Q_g	$V_{DS} = 100\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 10\text{ A}$		11	17	nC
Gate-Source Charge ^c	Q_{gs}			2.7		
Gate-Drain Charge ^c	Q_{gd}			4		
Gate Resistance	R_G			4		Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 100\text{ V}$, $R_L = 10\text{ }\Omega$ $I_D \equiv 10\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_G = 2.5\text{ }\Omega$		10	15	ns
Rise Time ^c	t_r			35	55	
Turn-Off Delay Time ^c	$t_{d(off)}$			25	40	
Fall Time ^c	t_f			40	60	
Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^\circ\text{C}$)^b						
Continuous Current	I_S				9	A
Pulsed Current	I_{SM}				10	
Forward Voltage ^a	V_{SD}	$I_F = 10\text{ A}$, $V_{GS} = 0\text{ V}$		0.9	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 10\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		100	150	ns
Peak Reverse Recovery Charge	$I_{RM(REC)}$			5	8	A
Reverse Recovery Charge	Q_{rr}			0.25	0.6	μC

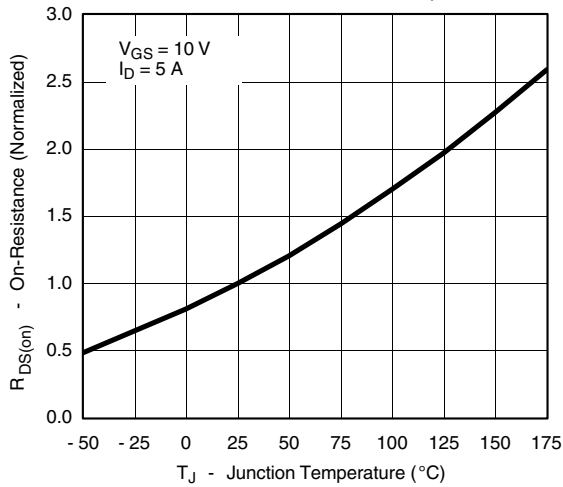
Notes:

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

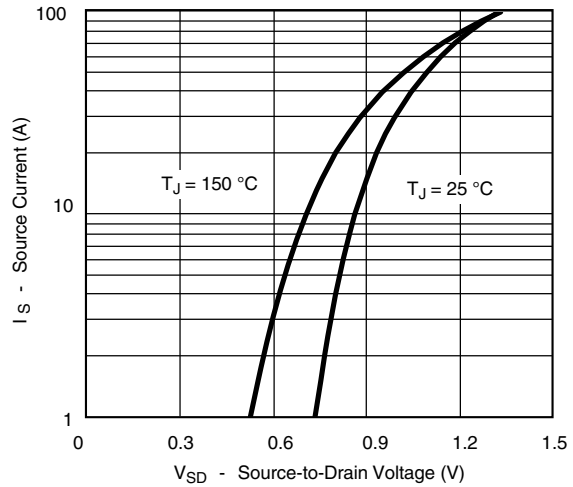
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

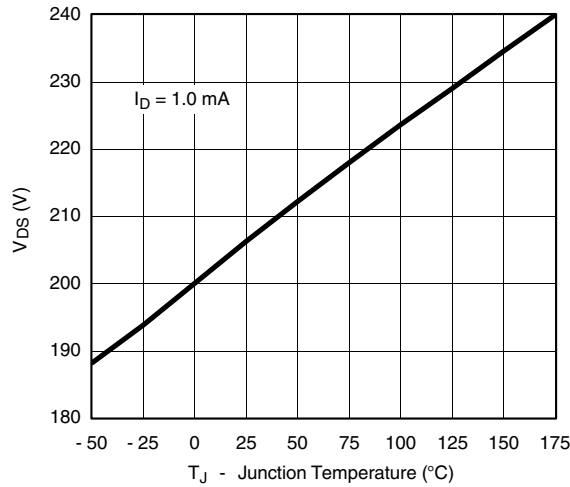
TYPICAL CHARACTERISTICS (25 °C unless noted)



On-Resistance vs. Junction Temperature

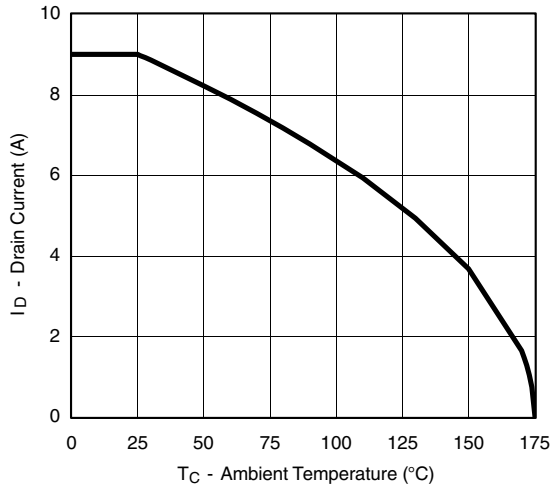


Source-Drain Diode Forward Voltage

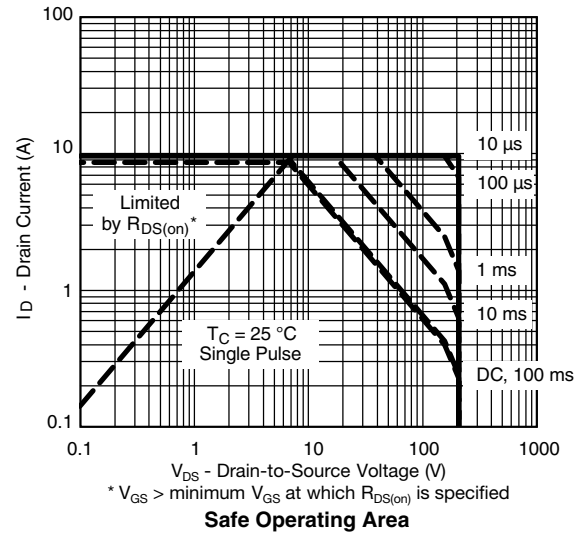


Drain Source Breakdown vs. Junction Temperature

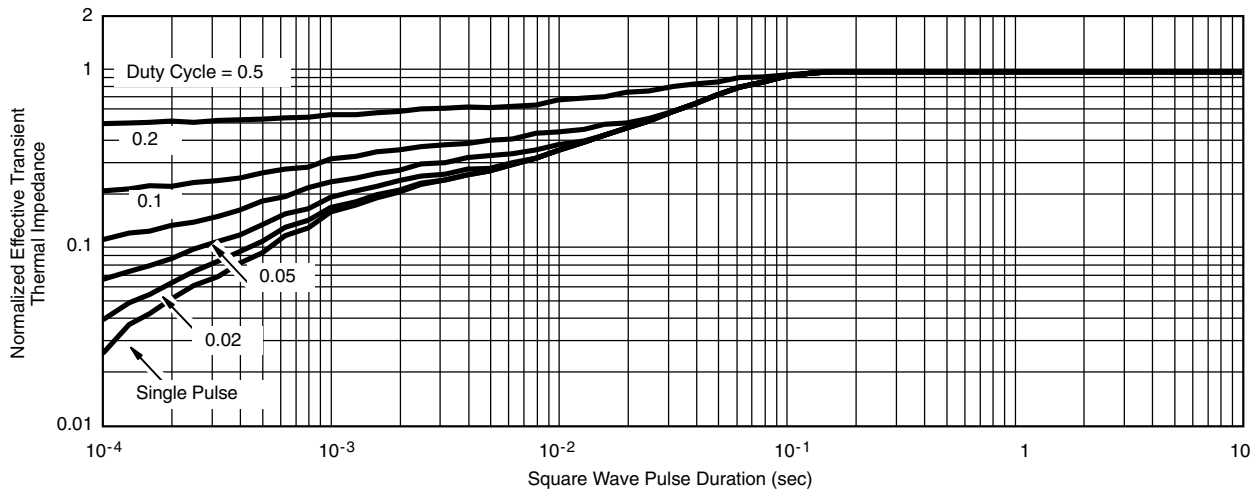
THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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