N-Channel 250-V (D-S) 175°C MOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
250	0.165 @ V_{GS} = 10 V	18

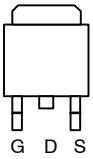
FEATURES

- TrenchFET® Power MOSFET
- 175°C Junction Temperature
- New Low Thermal Resistance Package

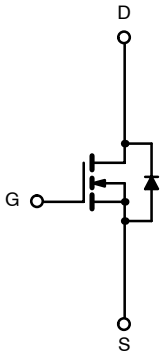
APPLICATIONS

- Automotive Such As:
  - Diesel Fuel Injection
  - High-Side Switch
  - Motor Drives

TO-263



Top View



N-Channel MOSFET

Ordering Information: SUM18N25-165—E3 (Lead Free)

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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	250	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current (T_J = 175°C)	T_C = 25°C	I_D	18	A
	T_C = 125°C		10.4	
Pulsed Drain Current		I_{DM}	20	
Single Pulse Avalanche Current		I_{AS}	5	
Single Pulse Avalanche Energy[a]	L = 0.1 mH	E_{AS}	1.25	mJ
Maximum Power Dissipation[a]	T_C = 25°C	P_D	150[b]	W
	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 (TO-263)[c]	R_{thJA}	40	°C/W
Junction-to-Case (Drain)		R_{thJC}	1.0	

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

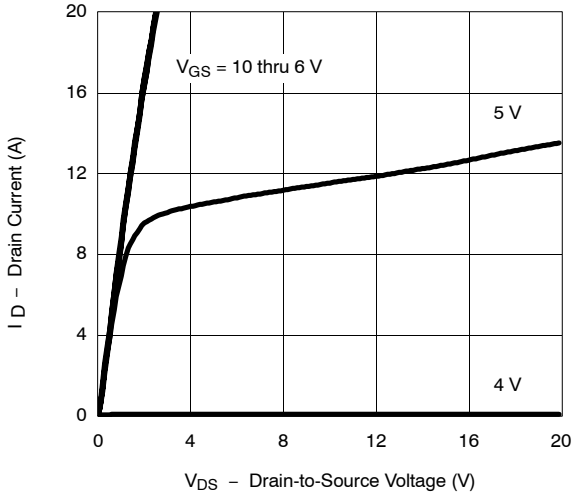
SPECIFICATIONS (T_J =25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{DS} = 0 V, I_D = 250 μA	250			V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	2.5		4	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 250 V, V_{GS} = 0 V			1	μA
		V_{DS} = 250 V, V_{GS} = 0 V, T_J = 125°C			50	
		V_{DS} = 250 V, V_{GS} = 0 V, T_J = 175°C			250	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≥ 15 V, V_{GS} = 10 V	20			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 14 A		0.130	0.165	Ω
		V_{GS} = 10 V, I_D = 14 A, T_J = 125°C			0.347	
		V_{GS} = 10 V, I_D = 14 A, T_J = 175°C			0.462	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 18 A		36		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		1950		pF
Output Capacitance	C_{oss}			160		
Reverse Transfer Capacitance	C_{rss}			70		
Total Gate Charge[c]	Q_g	V_{DS} = 125 V, V_{GS} = 10 V, I_D = 18 A		30	45	nC
Gate-Source Charge[c]	Q_{gs}			10		
Gate-Drain Charge[c]	Q_{gd}			10		
Gate Resistance	R_g			1.6		Ω
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 125 V, R_L = 7.0 Ω I_D ≅ 18 A, V_{GEN} = 10 V, R_g = 2.5 Ω		15	25	ns
Rise Time[c]	t_r			130	195	
Turn-Off Delay Time[c]	$t_{d(off)}$			30	45	
Fall Time[c]	t_f			100	150	
Source-Drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Continuous Current	I_S				18	A
Pulsed Current	I_{SM}				20	
Forward Voltage[a]	V_{SD}	I_F = 18 A, V_{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 18 A, di/dt = 100 A/μs		115	175	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			10	15	A
Reverse Recovery Charge	Q_{rr}			0.58	1.3	μC

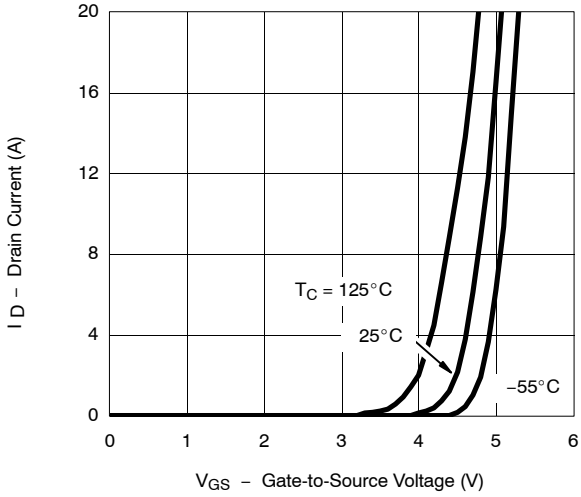
Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

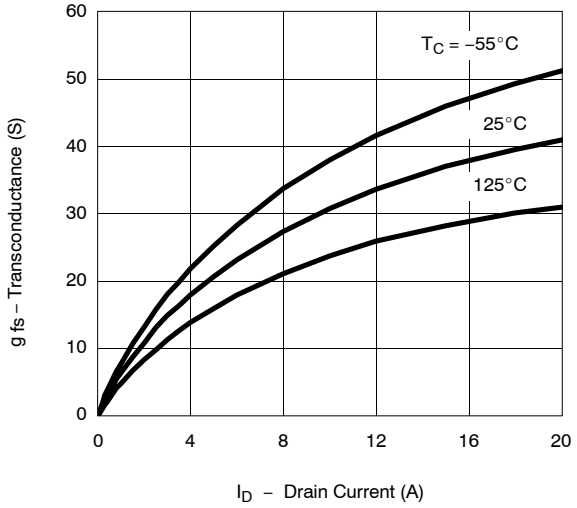
Output Characteristics



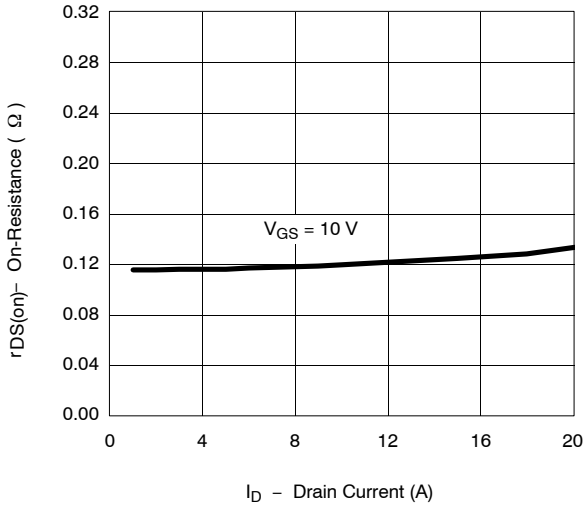
Transfer Characteristics



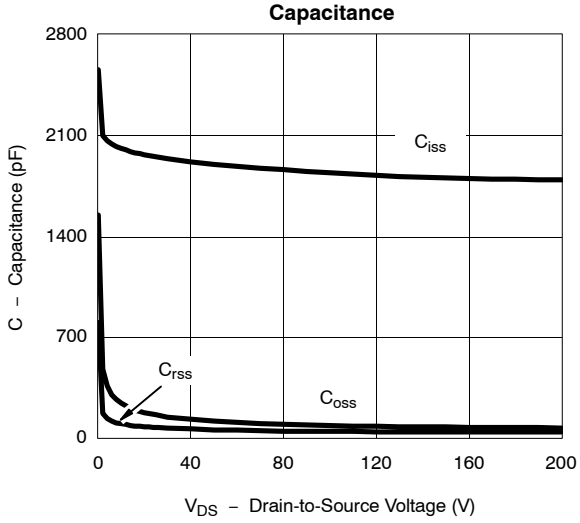
Transconductance



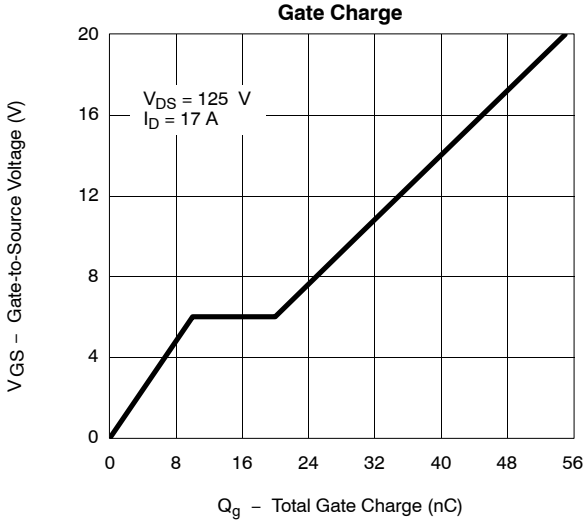
On-Resistance vs. Drain Current



Capacitance

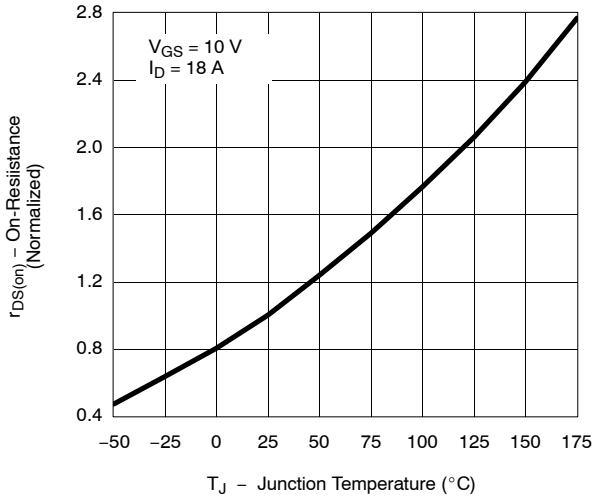


Gate Charge

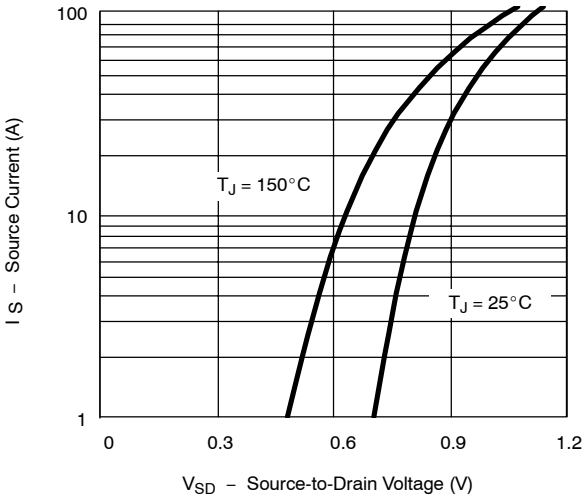


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

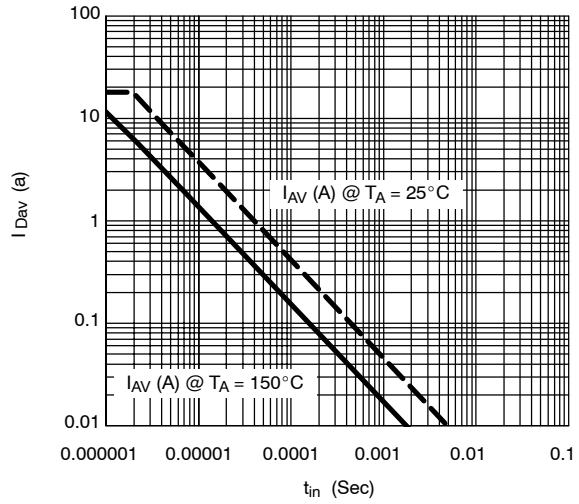
On-Resistance vs. Junction Temperature



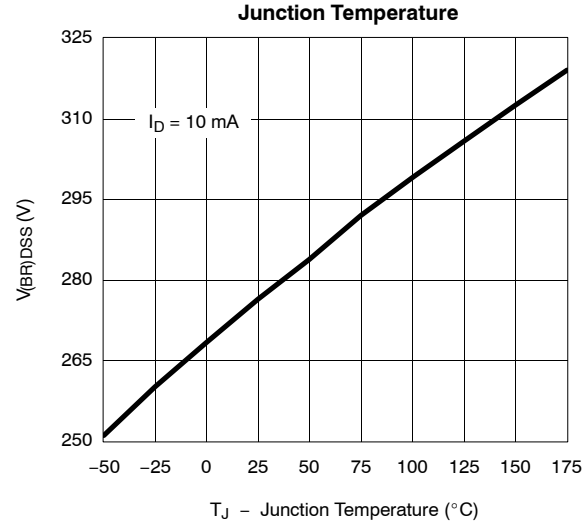
Source-Drain Diode Forward Voltage



Avalanche Current vs. Time

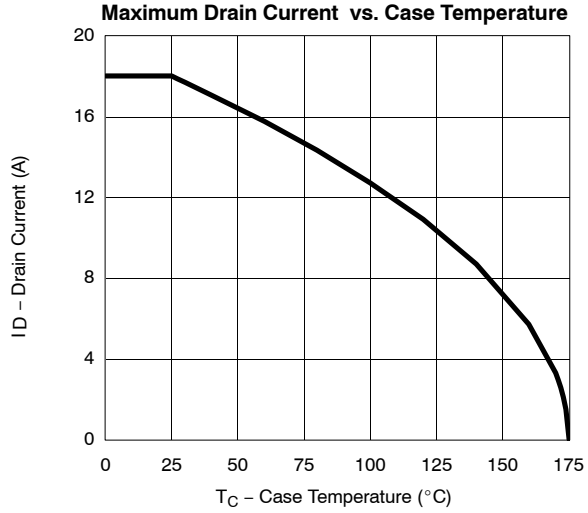


Drain Source Breakdown vs. Junction Temperature

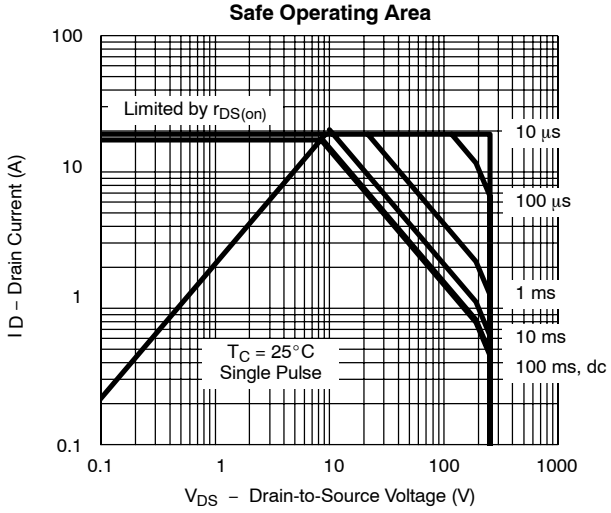


THERMAL RATINGS

Maximum Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case