



## N-Channel 250-V (D-S) 175 °C MOSFET

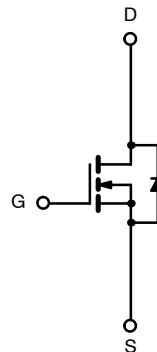
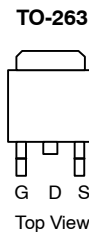
PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
250	0.165 @ $V_{GS} = 10$ V	18

### 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



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

N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	250	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175^\circ\text{C}$ )	$I_D$	$T_C = 25^\circ\text{C}$	18
		$T_C = 125^\circ\text{C}$	10.4
Pulsed Drain Current	$I_{DM}$	20	A
Single Pulse Avalanche Current	$I_{AS}$	5	
Single Pulse Avalanche Energy <sup>a</sup>	$E_{AS}$	1.25	mJ
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_C = 25^\circ\text{C}$	150 <sup>b</sup>
		$T_A = 25^\circ\text{C}^c$	3.75
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Limit	Unit
Junction-to-Ambient	$R_{thJA}$	40	$^\circ\text{C/W}$
Junction-to-Case (Drain)	$R_{thJC}$	1.0	

Notes

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



SPECIFICATIONS (T <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)							
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit	
<b>Static</b>							
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>DS</sub> = 0 V, I <sub>D</sub> = 250 μA	250			V	
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2.5		4		
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±100	nA	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 250 V, V <sub>GS</sub> = 0 V			1	μA	
		V <sub>DS</sub> = 250 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50		
		V <sub>DS</sub> = 250 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C			250		
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 15 V, V <sub>GS</sub> = 10 V	20			A	
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 14 A		0.130	0.165	Ω	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 14 A, T <sub>J</sub> = 125 °C			0.347		
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 14 A, T <sub>J</sub> = 175 °C			0.462		
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 18 A		36		S	
<b>Dynamic<sup>b</sup></b>							
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz		1950		pF	
Output Capacitance	C <sub>oss</sub>			160			
Reverse Transfer Capacitance	C <sub>riss</sub>			70			
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 125 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 18 A		30	45	nC	
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			10			
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			10			
Gate Resistance	R <sub>g</sub>			1.6		Ω	
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 125 V, R <sub>L</sub> = 7.0 Ω I <sub>D</sub> ≅ 18 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 2.5 Ω		15	25	ns	
Rise Time <sup>c</sup>	t <sub>r</sub>			130	195		
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			30	45		
Fall Time <sup>c</sup>	t <sub>f</sub>			100	150		
<b>Source-Drain Diode Ratings and Characteristics (T<sub>C</sub> = 25 °C)<sup>b</sup></b>							
Continuous Current	I <sub>S</sub>				18	A	
Pulsed Current	I <sub>SM</sub>				20		
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 18 A, V <sub>GS</sub> = 0 V		1.0	1.5	V	
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 18 A, di/dt = 100 A/μs		115	175	ns	
Peak Reverse Recovery Current	I <sub>RM(REC)</sub>				10	15	A
Reverse Recovery Charge	Q <sub>rr</sub>				0.58	1.3	μC

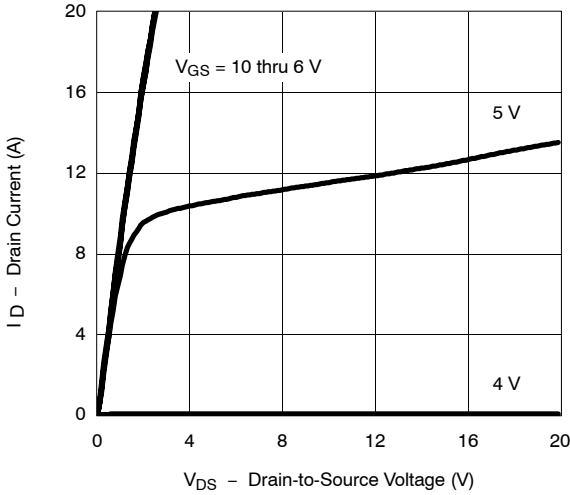
Notes

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

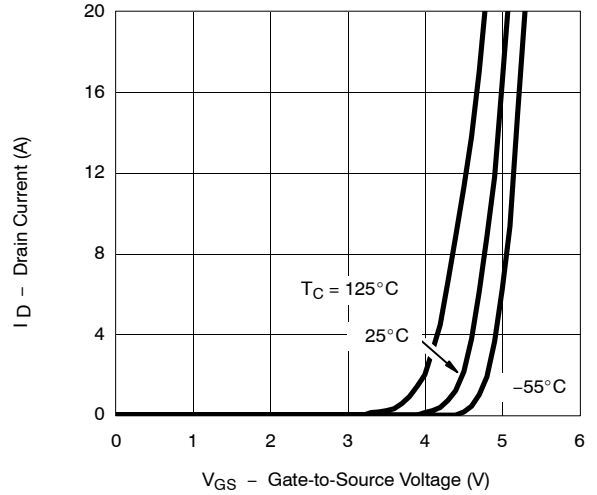


**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

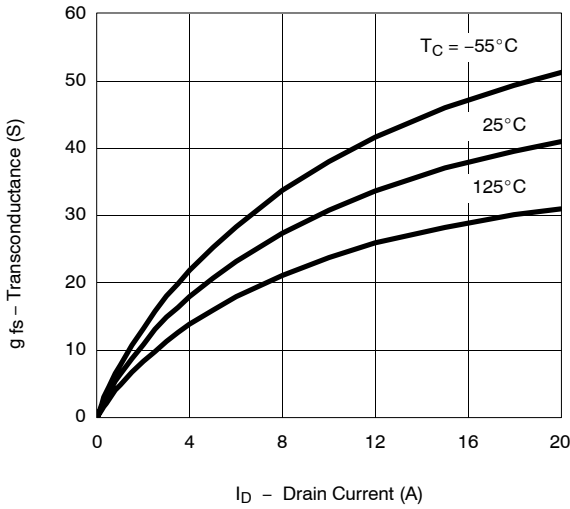
**Output Characteristics**



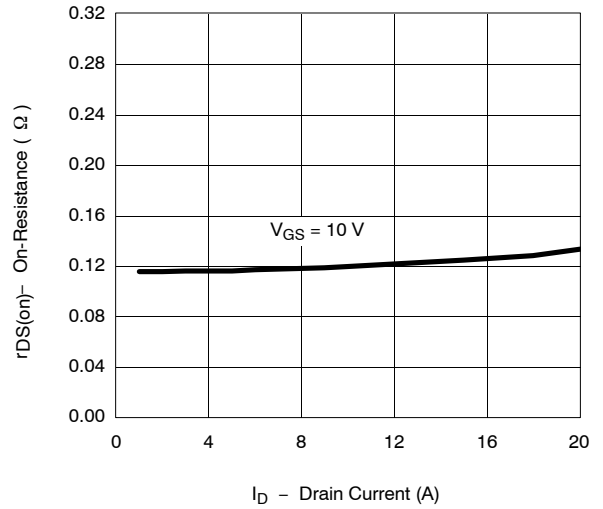
**Transfer Characteristics**



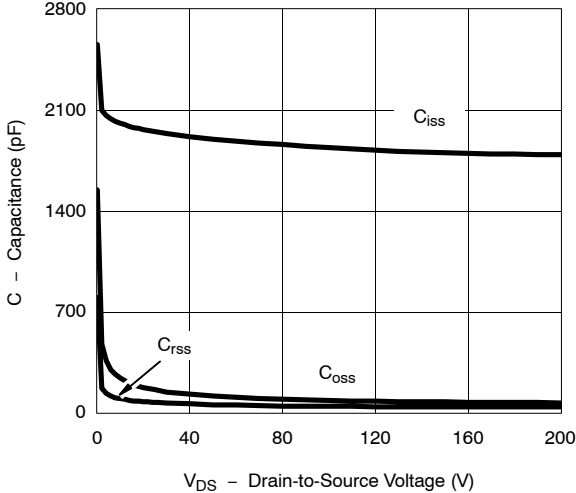
**Transconductance**



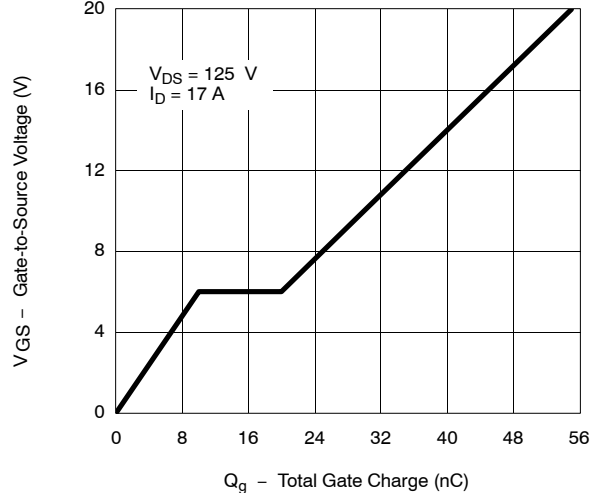
**On-Resistance vs. Drain Current**



**Capacitance**

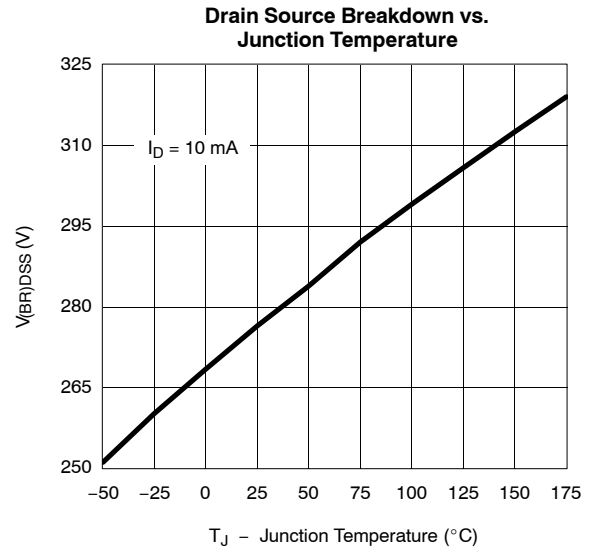
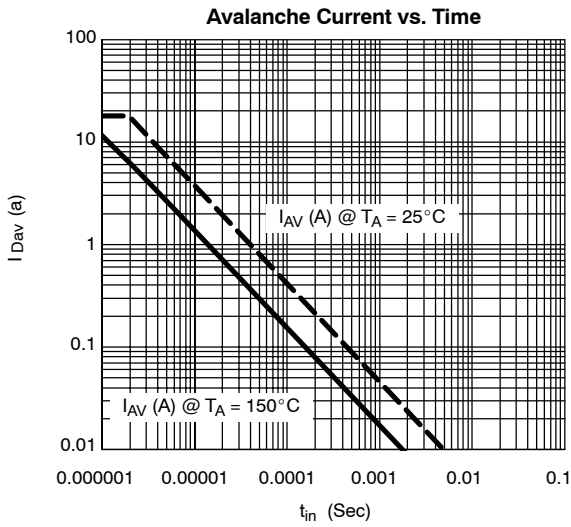
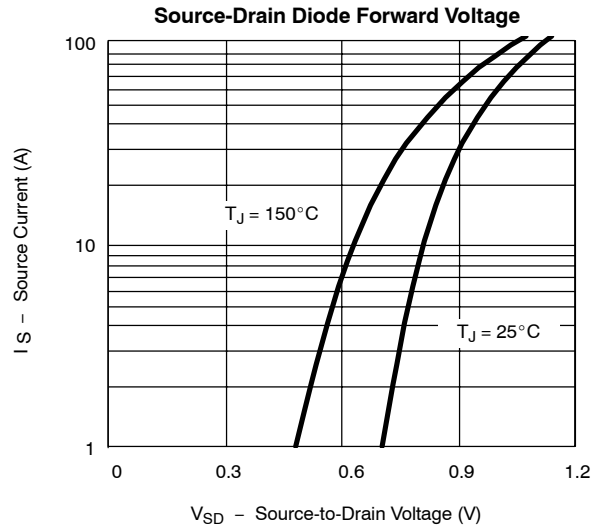
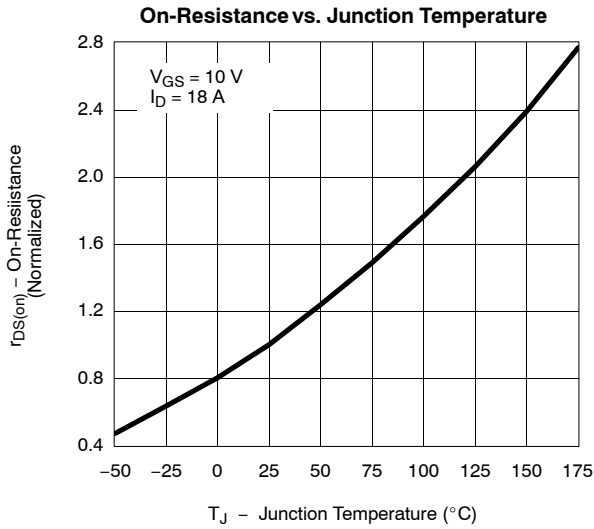


**Gate Charge**





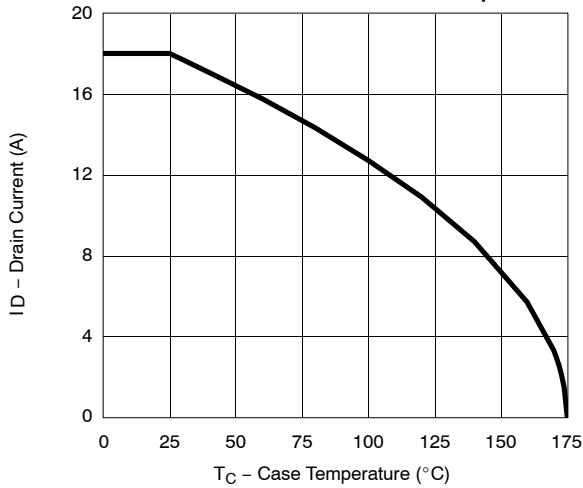
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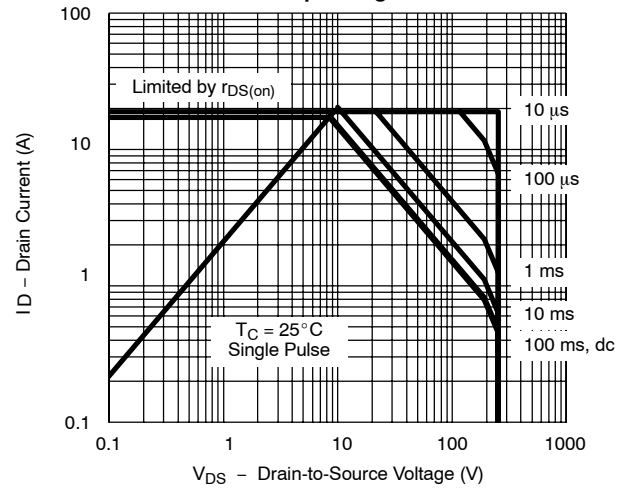


**THERMAL RATINGS**

Maximum Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

