



## N-Channel 20-V (D-S) 175°C MOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>
20	0.0026 @ $V_{GS} = 10$ V	110 <sup>a</sup>

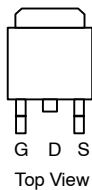
### FEATURES

- TrenchFET® Power MOSFET
- 175°C Junction Temperature
- Low Thermal Resistance Package
- High Threshold Voltage

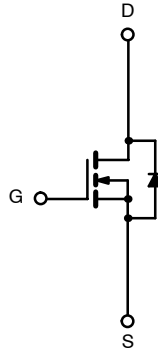
### APPLICATIONS

- Automotive

TO-263



DRAIN connected to TAB



N-Channel MOSFET

Ordering Information: SUM110N02-03—E3

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		$V_{DS}$	20	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175^\circ\text{C}$ )	$T_C = 25^\circ\text{C}$	$I_D$	110 <sup>a</sup>	A
	$T_C = 125^\circ\text{C}$		110 <sup>a</sup>	
Pulsed Drain Current		$I_{DM}$	300 <sup>b</sup>	
Avalanche Current		$I_{AR}$	60	
Repetitive Avalanche Energy <sup>c</sup>	$L = 0.1$ mH	$E_{AR}$	180	mJ
Maximum Power Dissipation <sup>c</sup>	$T_C = 25^\circ\text{C}$	$P_D$	230 <sup>d</sup>	W
	$T_A = 25^\circ\text{C}$ <sup>e</sup>		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 (PCB Mount) <sup>e</sup>		$R_{thJA}$	40	$^\circ\text{C/W}$
Junction-to-Case		$R_{thJC}$	0.65	

Notes

- Package limited.
- Pulse width  $\leq 300$   $\mu\text{s}$ , single pulse
- 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	20			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	3	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> = 16 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50	
		V <sub>DS</sub> = 16 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> ≥ 5 V, V <sub>GS</sub> = 10 V	120			A
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A		0.002	0.0026	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 125 °C			0.0037	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 175 °C			0.0047	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A	20			S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 10 V, f = 1 MHz		9300		pF
Output Capacitance	C <sub>oss</sub>			3200		
Reverse Transfer Capacitance	C <sub>rss</sub>			1820		
Total Gate Charge <sup>b</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 85 A		145	220	nC
Gate-Source Charge <sup>b</sup>	Q <sub>gs</sub>			50		
Gate-Drain Charge <sup>b</sup>	Q <sub>gd</sub>			30		
Turn-On Delay Time <sup>b</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 10 V, R <sub>L</sub> = 0.117 Ω I <sub>D</sub> ≅ 85 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 2.5 Ω		30	45	ns
Rise Time <sup>b</sup>	t <sub>r</sub>			80	120	
Turn-Off Delay Time <sup>b</sup>	t <sub>d(off)</sub>			55	90	
Fall Time <sup>b</sup>	t <sub>f</sub>			30	45	
<b>Source-Drain Diode Ratings and Characteristics (T<sub>C</sub> = 25 °C)<sup>c</sup></b>						
Continuous Current	I <sub>S</sub>				110	A
Pulsed Current	I <sub>SM</sub>				300	
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 85 A, V <sub>GS</sub> = 0 V		1.1	1.5	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 85 A, di/dt = 100 A/μs		65	120	ns
Peak Reverse Recovery Current	I <sub>RM</sub>			1.8	4	A
Reverse Recovery Charge	Q <sub>rr</sub>			0.06	0.24	μC

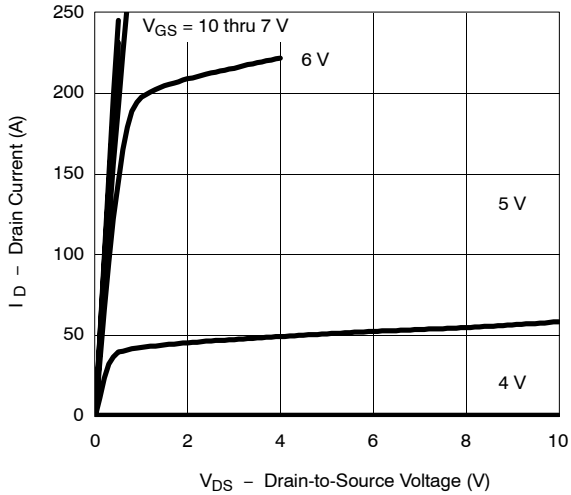
## Notes

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

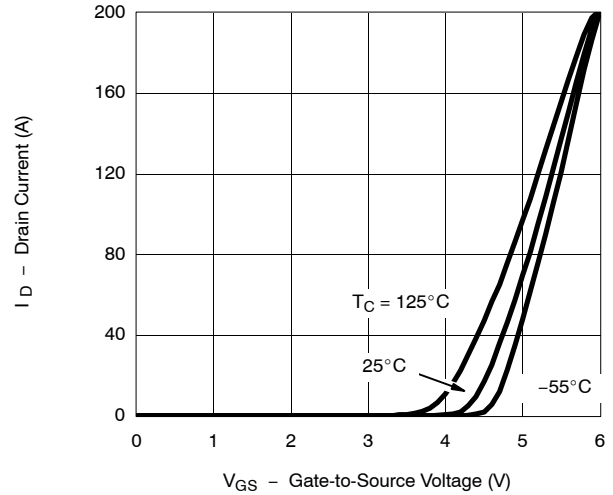


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

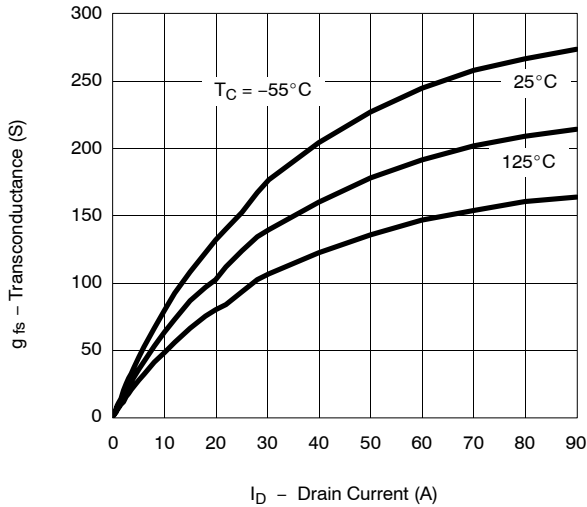
**Output Characteristics**



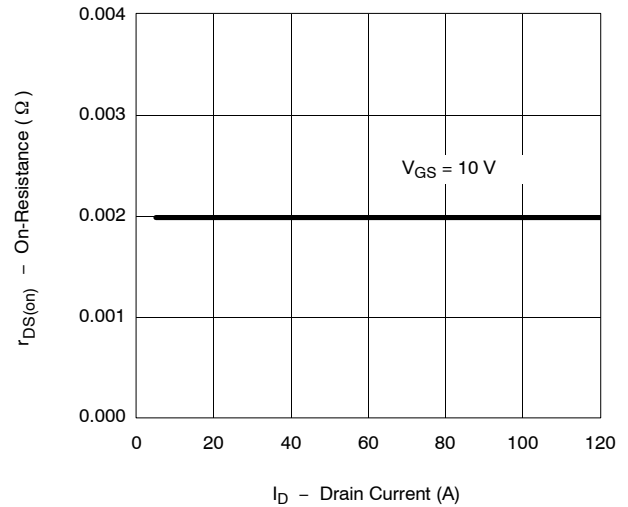
**Transfer Characteristics**



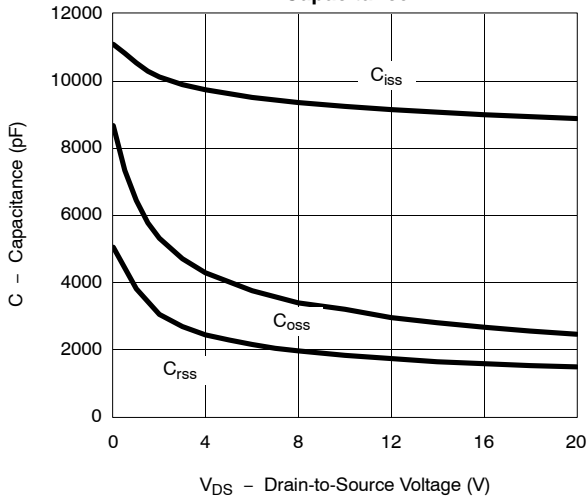
**Transconductance**



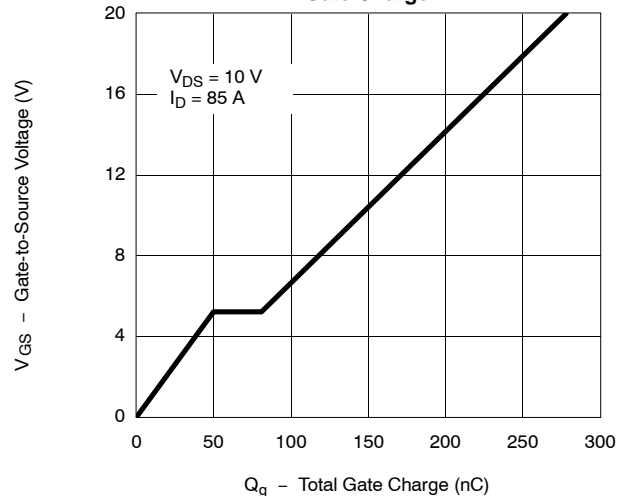
**On-Resistance vs. Drain Current**



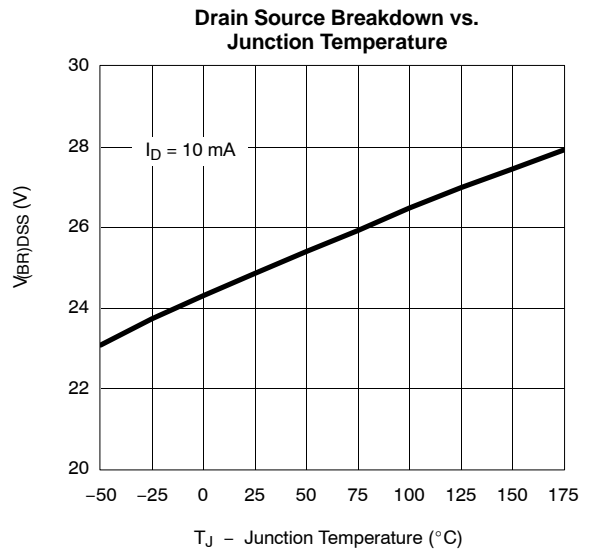
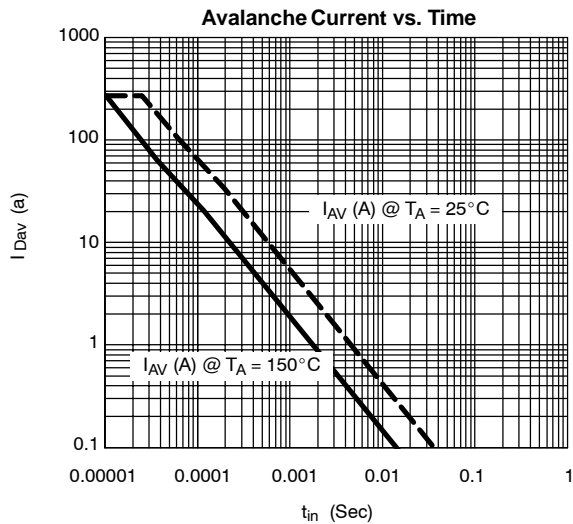
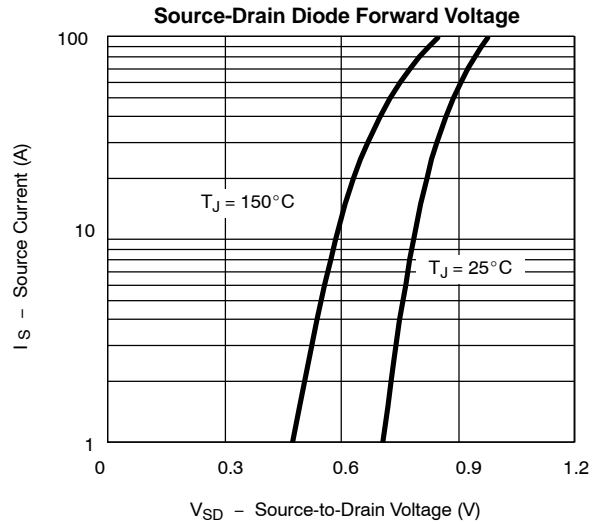
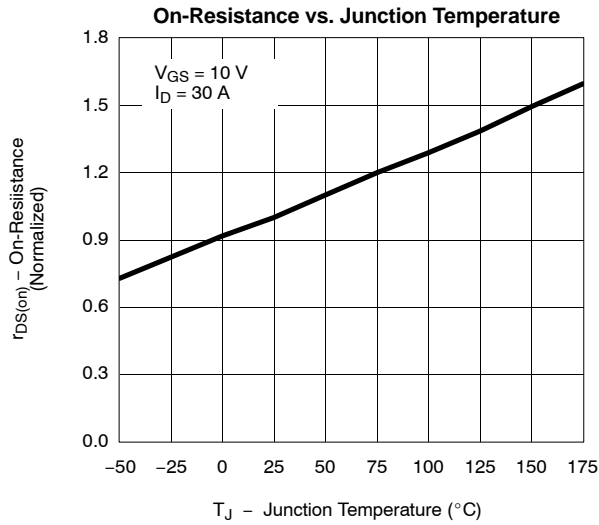
**Capacitance**



**Gate Charge**



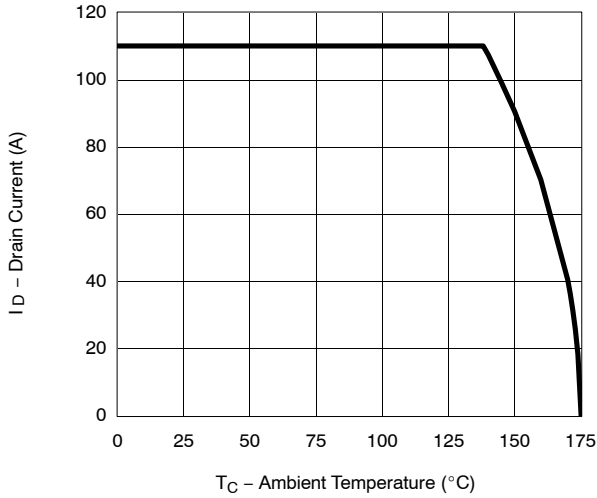
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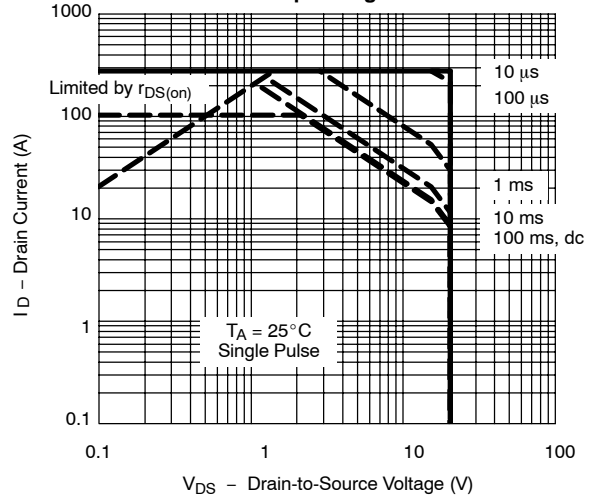


**THERMAL RATINGS**

**Maximum Avalanche and Drain Current vs. Case Temperature**



**Safe Operating Area**



**Normalized Thermal Transient Impedance, Junction-to-Case**

