

N-Channel 250-V (D-S) 175 °C MOSFET

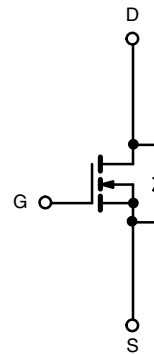
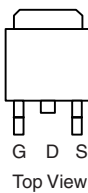
PRODUCT SUMMARY

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

FEATURES

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


RoHS
COMPLIANT

TO-263

Ordering Information: SUM18N25-165-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}	250	V	
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ($T_J = 175$ °C)	I_D	$T_C = 25$ °C	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	E_{AS}	1.25	mJ	
Maximum Power Dissipation ^a	P_D	$T_C = 25$ °C	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	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	1.0	

Notes:

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

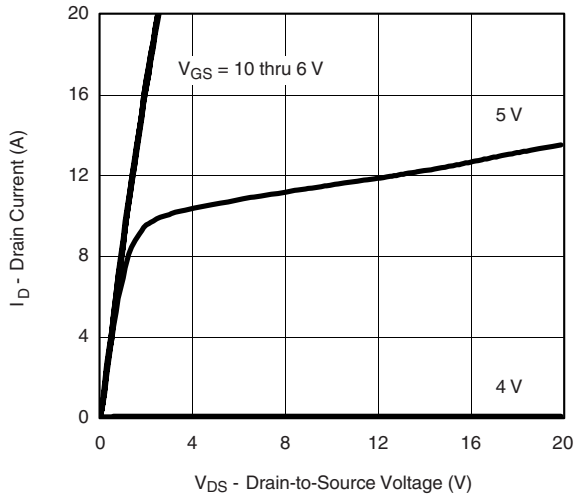


SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{DS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	250			V	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.5		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}	$V_{DS} = 250\text{ V}, V_{GS} = 0\text{ V}$			1	μA	
		$V_{DS} = 250\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50		
		$V_{DS} = 250\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			250		
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 15\text{ V}, V_{GS} = 10\text{ V}$	20			A	
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 14\text{ A}$		0.130	0.165	Ω	
		$V_{GS} = 10\text{ V}, I_D = 14\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.347		
		$V_{GS} = 10\text{ V}, I_D = 14\text{ A}, T_J = 175\text{ }^\circ\text{C}$			0.462		
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 18\text{ A}$		36		S	
Dynamic^b							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		1950		pF	
Output Capacitance	C_{oss}			160			
Reverse Transfer Capacitance	C_{rss}			70			
Total Gate Charge ^c	Q_g	$V_{DS} = 125\text{ V}, V_{GS} = 10\text{ V}, I_D = 18\text{ A}$		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	$t_{d(on)}$	$V_{DD} = 125\text{ V}, R_L = 7.0\text{ }\Omega$ $I_D \cong 18\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$		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 $T_C = 25\text{ }^\circ\text{C}$ ^b							
Continuous Current	I_S				18	A	
Pulsed Current	I_{SM}				20		
Forward Voltage ^a	V_{SD}	$I_F = 18\text{ A}, V_{GS} = 0\text{ V}$		1.0	1.5	V	
Reverse Recovery Time	t_{rr}	$I_F = 18\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		115	175	ns	
Peak Reverse Recovery Charge	$I_{RM(REC)}$				10	15	A
Reverse Recovery Charge	Q_{rr}				0.58	1.3	μC

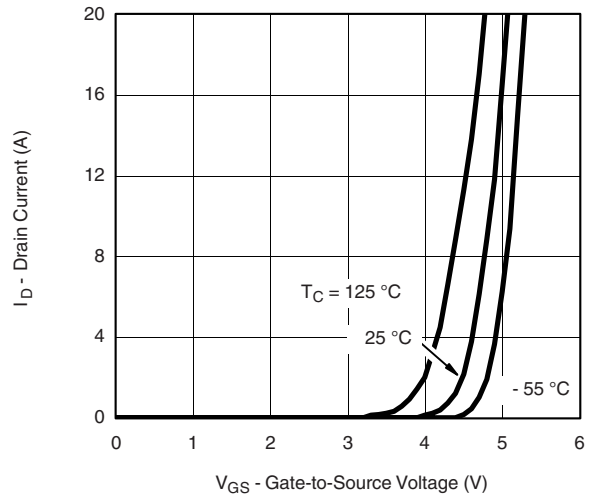
Notes:

- 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.

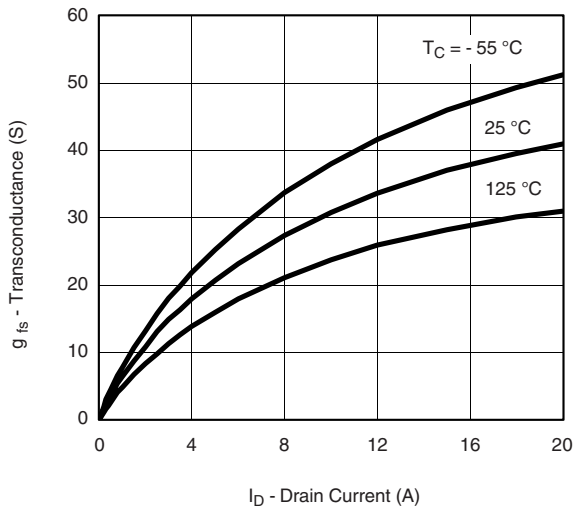
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted


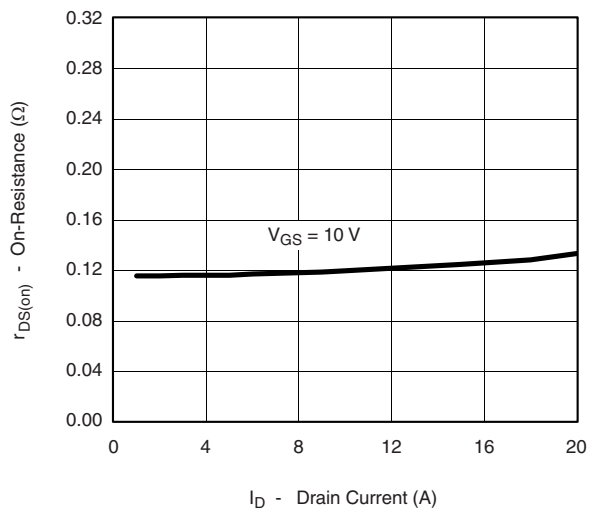
V_{DS} - Drain-to-Source Voltage (V)
Output Characteristics



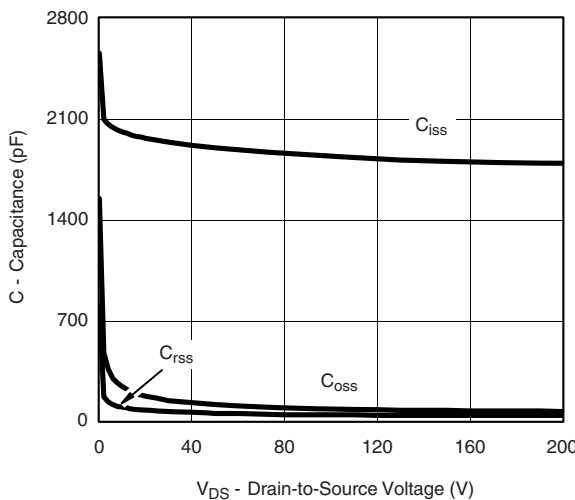
V_{GS} - Gate-to-Source Voltage (V)
Transfer Characteristics



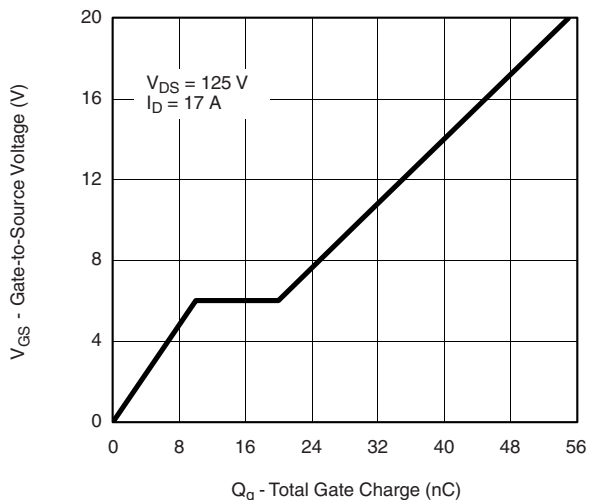
I_D - Drain Current (A)
Transconductance



I_D - Drain Current (A)
On-Resistance vs. Drain Current

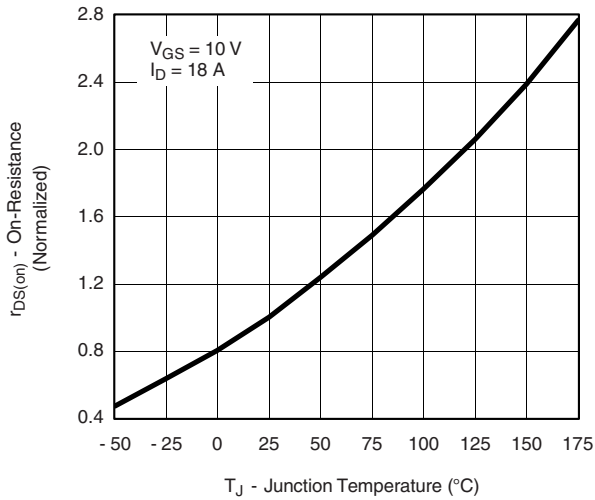


V_{DS} - Drain-to-Source Voltage (V)
Capacitance

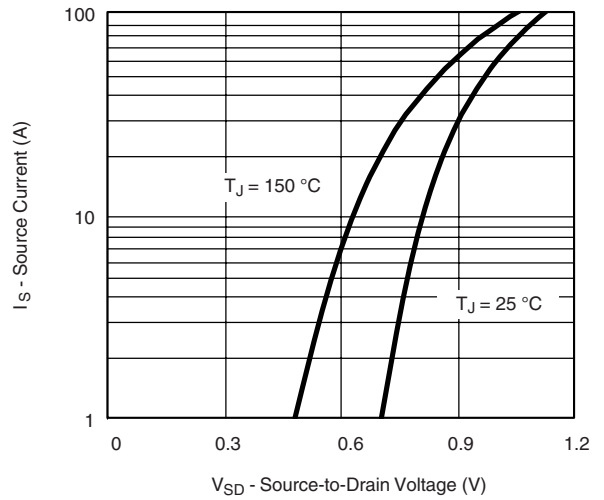


Q_g - Total Gate Charge (nC)
Gate Charge

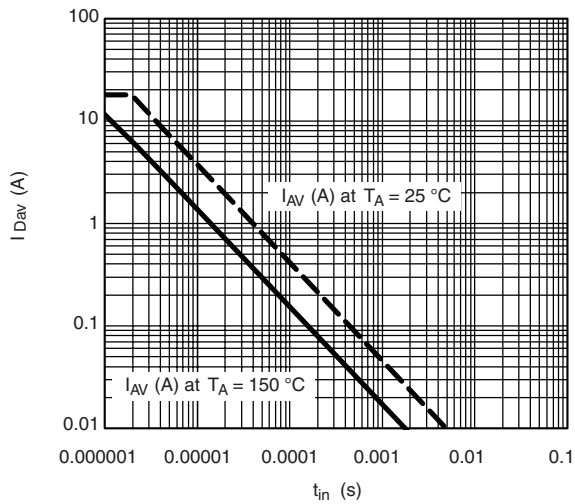
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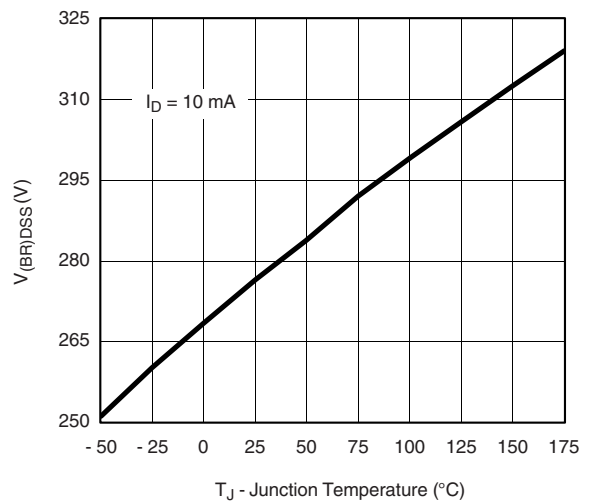
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



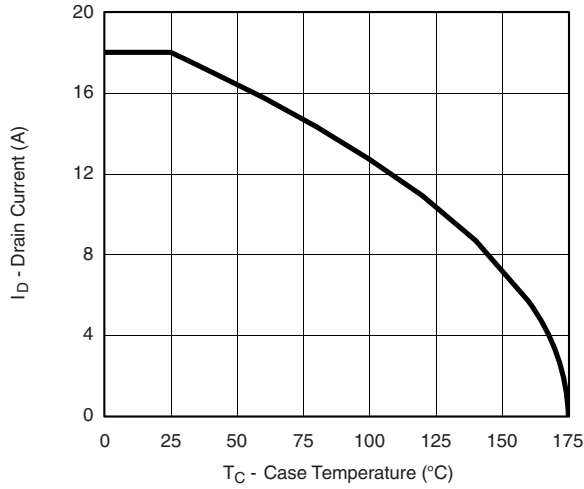
Avalanche Current vs. Time



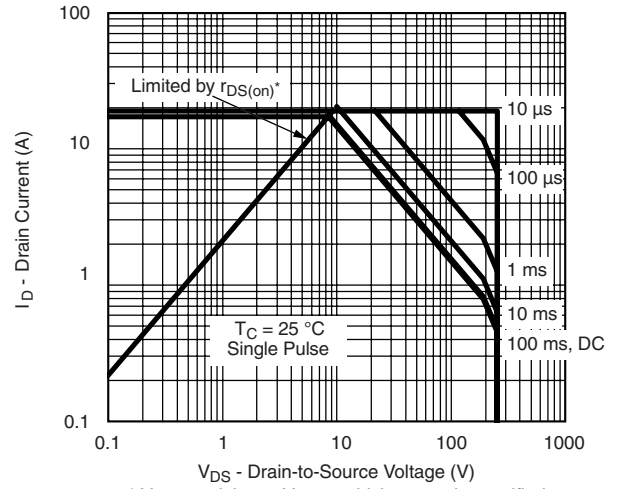
Drain Source Breakdown vs. Junction Temperature



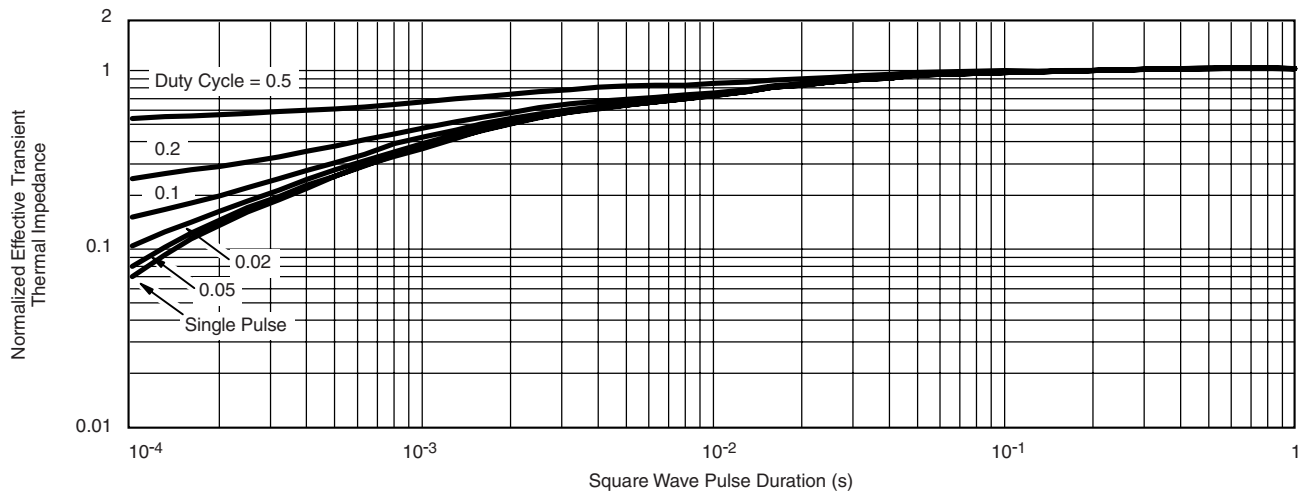
THERMAL RATINGS



Maximum Drain Current vs. Case Temperature



Safe Operating Area
* $V_{GS} >$ minimum V_{GS} at which $r_{DS(on)}$ is specified



Normalized Thermal Transient Impedance, Junction-to-Case

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