



P-Channel 100-V (D-S) MOSFET

PRODUCT SUMMARY

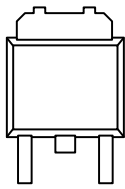
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ)
- 100	0.019 at $V_{GS} = - 10$ V	- 90	128 nC

FEATURES

- TrenchFET[®] Power MOSFET

RoHS
COMPLIANT

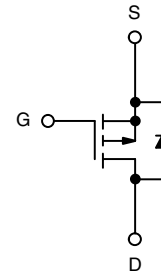
TO-263



G D S

Top View

Drain Connected to Tab



P-Channel MOSFET

Ordering Information: SUM90P10-19-E3 (Lead (Pb)-free)

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 100	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C)	$T_C = 25$ °C	- 90	A
	$T_C = 125$ °C	- 52	
	$T_A = 25$ °C	- 17 ^{b, c}	
	$T_A = 125$ °C	- 9.9 ^{b, c}	
Pulsed Drain Current	I_{DM}	- 90	
Continuous Source-Drain Diode Current	$T_C = 25$ °C	- 90	
	$T_A = 25$ °C	- 9 ^{b, c}	
Avalanche Current	I_{AS}	- 75	
Single-Pulse Avalanche Energy	E_{AS}	281	mJ
Maximum Power Dissipation	$T_C = 25$ °C	375	W
	$T_C = 125$ °C	125	
	$T_A = 25$ °C	13.6 ^{b, c}	
	$T_A = 125$ °C	4.5 ^{b, c}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	8	11	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	0.33	0.4	

Notes:

- Based on $T_C = 25$ °C.
- Surface Mounted on 1" x 1" FR4 Board.
- $t = 10$ s.
- Maximum under Steady State conditions is 40 °C/W.

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}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-100			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		-111		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			7		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-2		-4.5	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -100\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -100\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			-500	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = -10\text{ V}$	-90			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -20\text{ A}$		0.0155	0.019	Ω
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -20\text{ A}$		70		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -50\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		12000		pF
Output Capacitance	C_{oss}			700		
Reverse Transfer Capacitance	C_{rss}			1670		
Total Gate Charge	Q_g	$V_{DS} = -50\text{ V}, V_{GS} = -10\text{ V}, I_D = -90\text{ A}$		218	330	nC
Gate-Source Charge	Q_{gs}			55		
Gate-Drain Charge	Q_{gd}			55		
Gate Resistance	R_g	$f = 1\text{ MHz}$		3.5		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -50\text{ V}, R_L = 0.56\text{ }\Omega$ $I_D \cong -90\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		30	50	ns
Rise Time	t_r			720	1100	
Turn-Off Delay Time	$t_{d(off)}$			125	190	
Fall Time	t_f			610	920	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			-90	A
Pulse Diode Forward Current ^a	I_{SM}				-250	
Body Diode Voltage	V_{SD}	$I_S = -20\text{ A}$		-0.8	-1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		80	120	ns
Body Diode Reverse Recovery Charge	Q_{rr}			230	350	nC
Reverse Recovery Fall Time	t_a			62		ns
Reverse Recovery Rise Time	t_b			18		

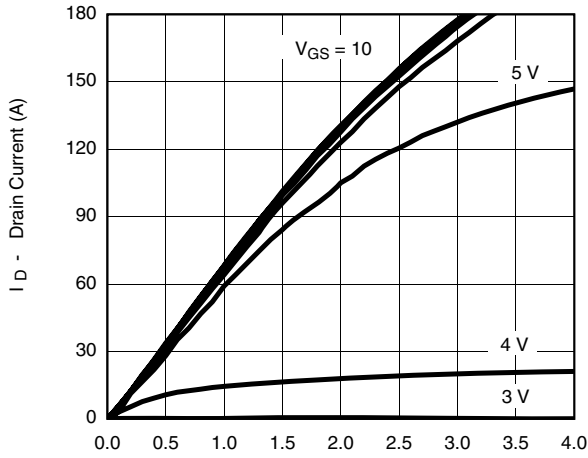
Notes:

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

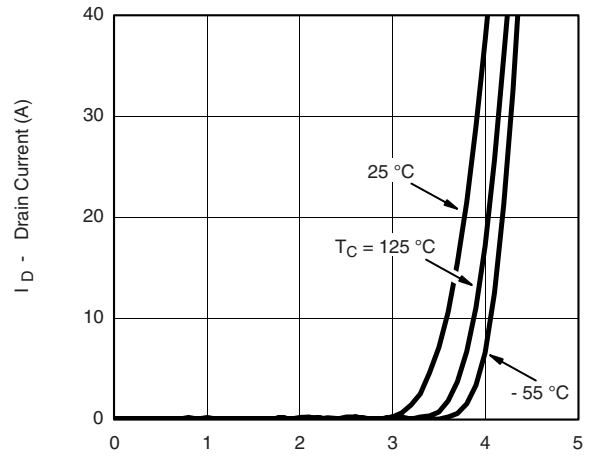
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



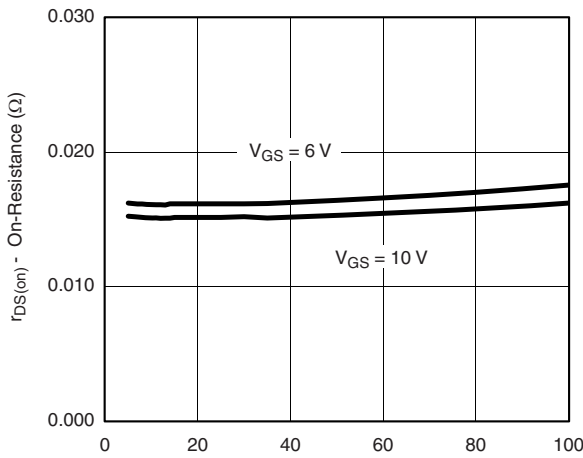
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



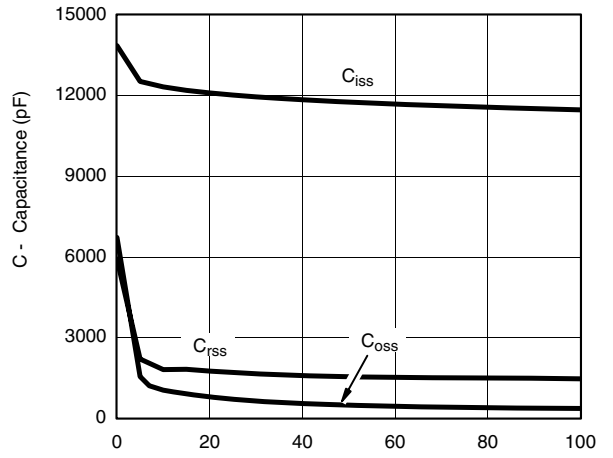
V_{DS} - Drain-to-Source Voltage (V)
Output Characteristics



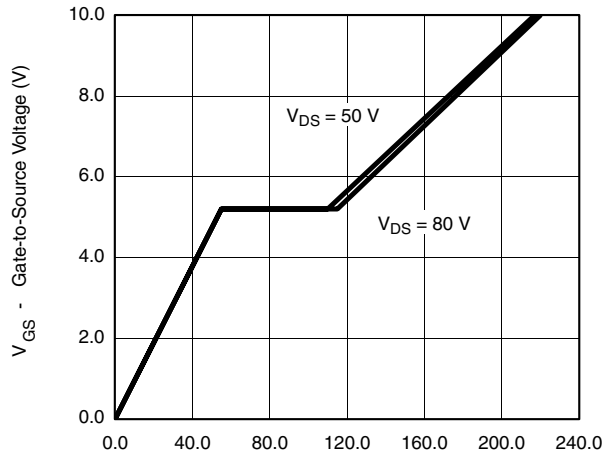
V_{GS} - Gate-to-Source Voltage (V)
Transfer Characteristics



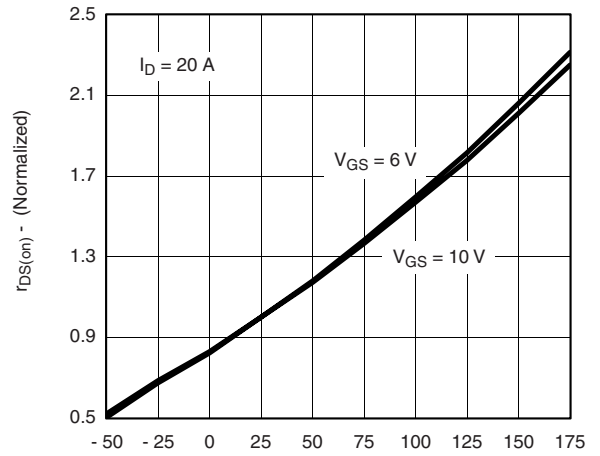
I_D - Drain Current (A)
On-Resistance vs. Drain Current



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



Q_g - Total Gate Charge (nC)
Gate Charge



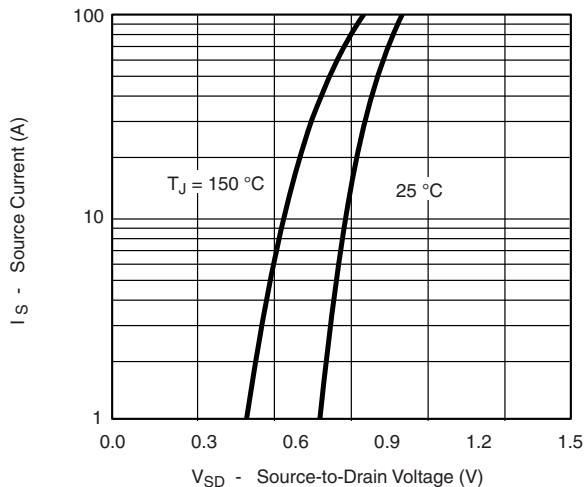
T_J - Junction Temperature ($^{\circ}C$)
On-Resistance vs. Junction Temperature

SUM90P10-19

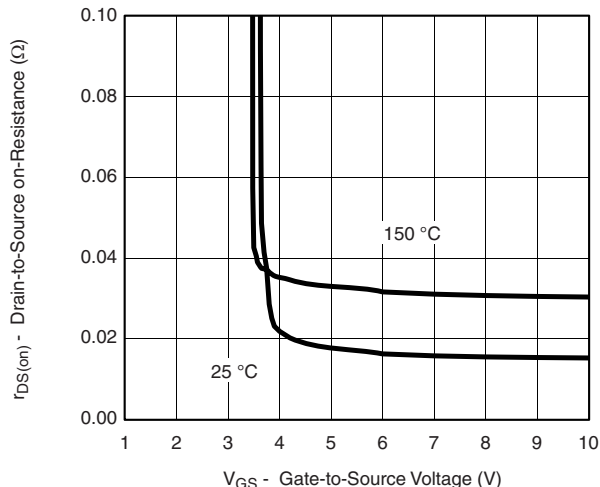
Vishay Siliconix



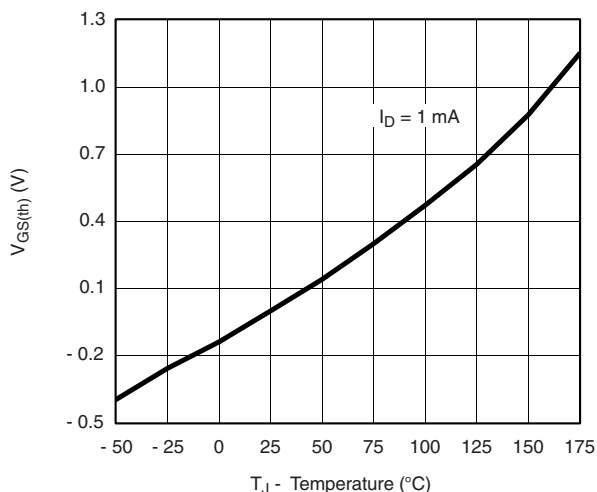
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



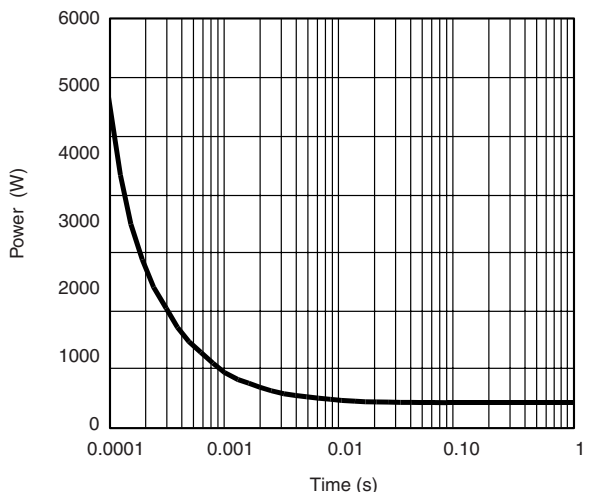
Source-Drain Diode Forward Voltage



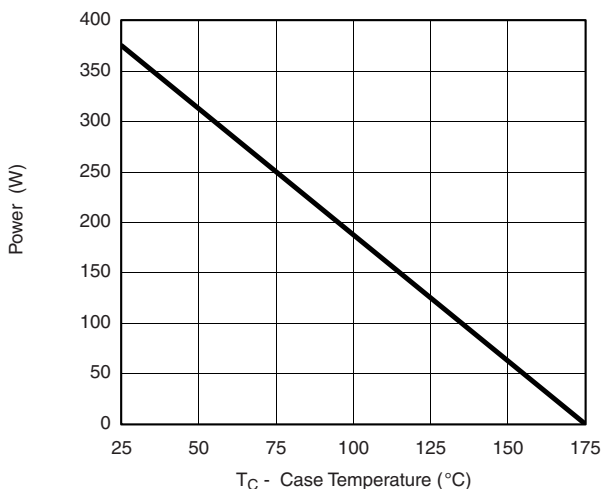
On-Resistance vs. Gate-to-Source Voltage



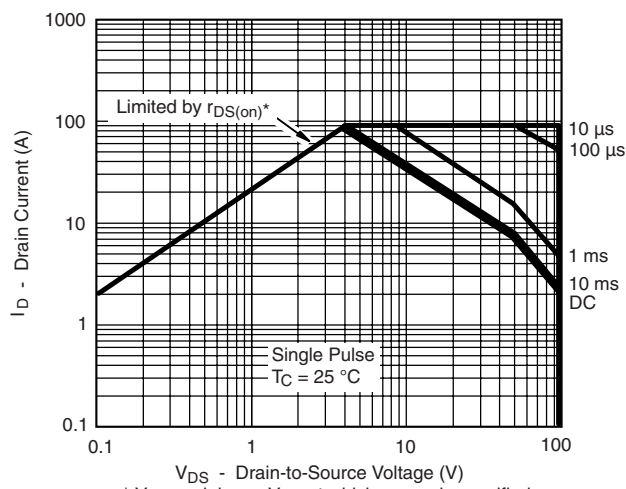
Threshold Voltage



Single Pulse Power, Junction-to-Case ($T_C = 25\text{ °C}$)



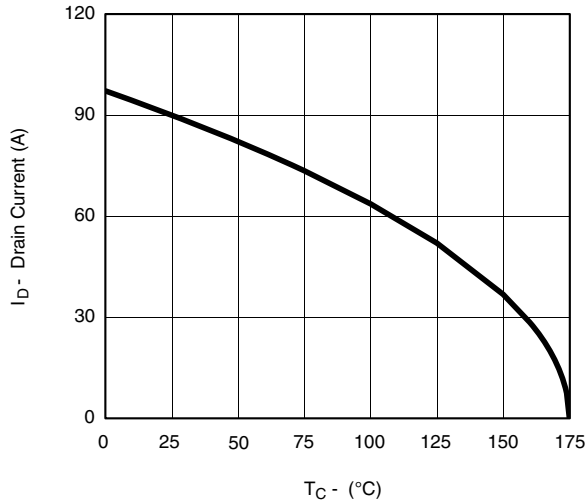
Power Derating, Junction-to-Case



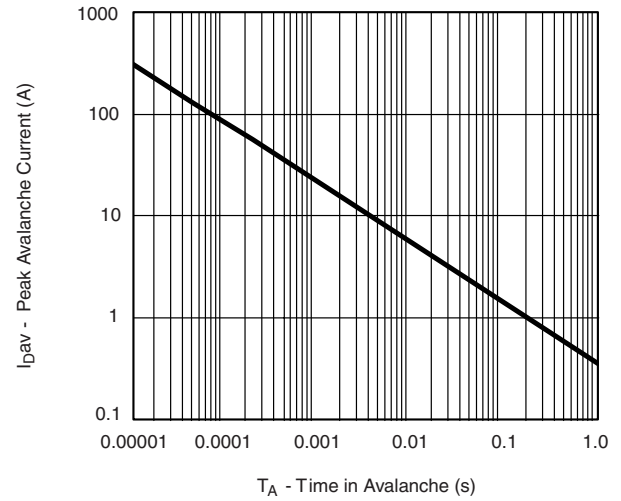
Safe Operating Area



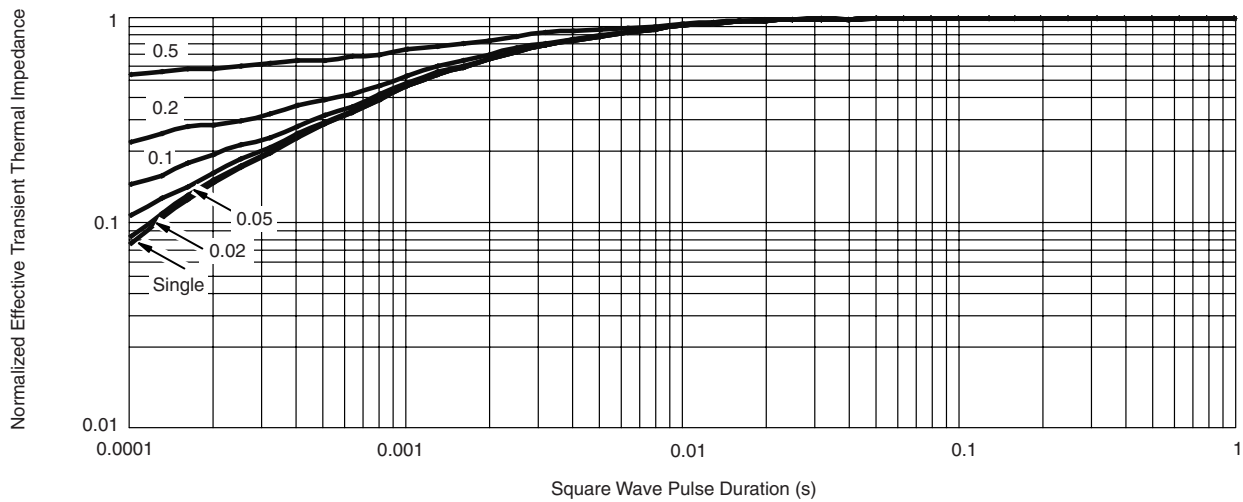
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Max Avalanche and Drain Current vs. Case Temperature



Avalanche Current vs. Time



Normalized Thermal Transient Impedance, Junction-to-Case

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