

N-Channel 200-V (D-S) MOSFET

PRODUCT SUMMARY			
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ)
200	0.038 at $V_{GS} = 15$ V	52	81
	0.039 at $V_{GS} = 10$ V	52	

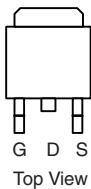
FEATURES

- TrenchFET[®] Power MOSFETS
- 175 °C Junction Temperature
- 100 % R_g and UIS Tested

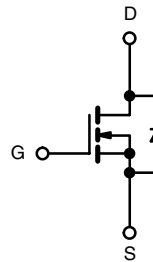
APPLICATIONS

- Power Supply
- Primary Side
- Lighting
- Industrial

TO-263



Ordering Information: SUM52N20-39P-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}	200	V	
Gate-Source Voltage	V_{GS}	± 25		
Continuous Drain Current ($T_J = 175$ °C)	I_D	$T_C = 25$ °C	52	A
		$T_C = 100$ °C	32.5	
Pulsed Drain Current	I_{DM}	100		
Single Pulse Avalanche Current	I_{AS}	25		
Single Pulse Avalanche Energy ^a	E_{AS}	31	mJ	
Maximum Power Dissipation ^a	P_D	$T_C = 25$ °C	250 ^b	W
		$T_A = 25$ °C ^c	3.12	
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) ^c	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	0.5	

Notes:

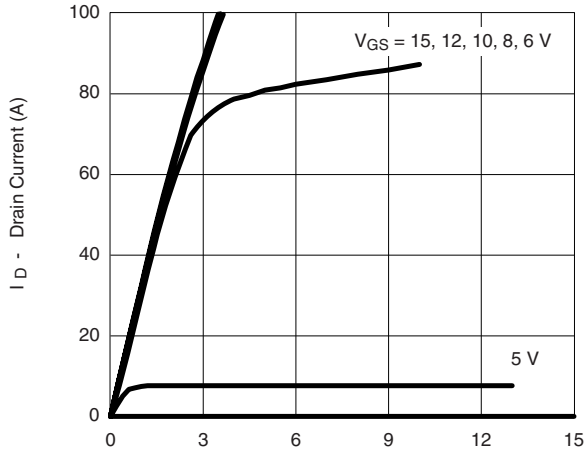
- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When Mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{DS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	200			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.5		4.5	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 25\text{ V}$			± 300	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}, T_J = 100\text{ }^\circ\text{C}$			25	
		$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$			250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	50			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		0.031	0.039	Ω
		$V_{GS} = 15\text{ V}, I_D = 20\text{ A}$		0.0305	0.038	
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 100\text{ }^\circ\text{C}$			0.071	
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 150\text{ }^\circ\text{C}$			0.094	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$	25			S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		4220		μF
Output Capacitance	C_{oss}			400		
Reverse Transfer Capacitance	C_{rss}			185		
Total Gate Charge ^c	Q_g	$V_{DS} = 100\text{ V}, V_{GS} = 15\text{ V}, I_D = 50\text{ A}$		123	185	nC
				81	122	
Gate-Source Charge ^c	Q_{gs}	$V_{DS} = 100\text{ V}, V_{GS} = 10\text{ V}, I_D = 50\text{ A}$		21		
Gate-Drain Charge ^c	Q_{gd}			27		
Gate Resistance	R_g	$f = 1\text{ MHz}$		1.2	1.8	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 100\text{ V}, R_L = 2\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		18	30	ns
Rise Time ^c	t_r			170	260	
Turn-Off Delay Time ^c	$t_{d(off)}$			34	51	
Fall Time ^c	t_f			9	18	
Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^\circ\text{C}$) ^b						
Continuous Current	I_S				52	A
Pulsed Current	I_{SM}				100	
Forward Voltage ^a	V_{SD}	$I_F = 20\text{ A}, V_{GS} = 0\text{ V}$		0.86	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 40\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		133	200	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			8	12	A
Reverse Recovery Charge	Q_{rr}			0.54	0.81	μC
Reverse Recovery Fall Time	t_a			94		nS
Reverse Recovery Rise Time	t_b			39		

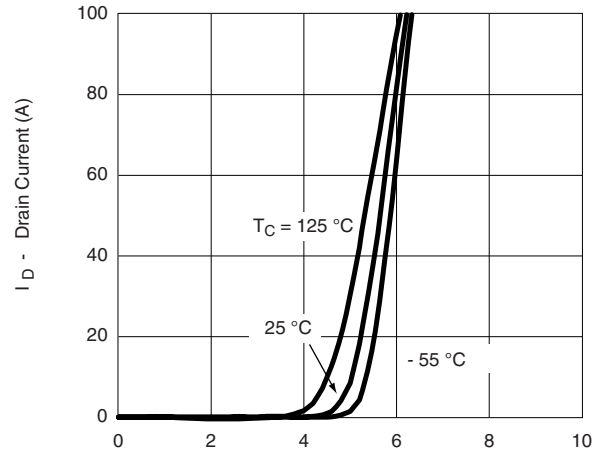
Notes:

- 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.

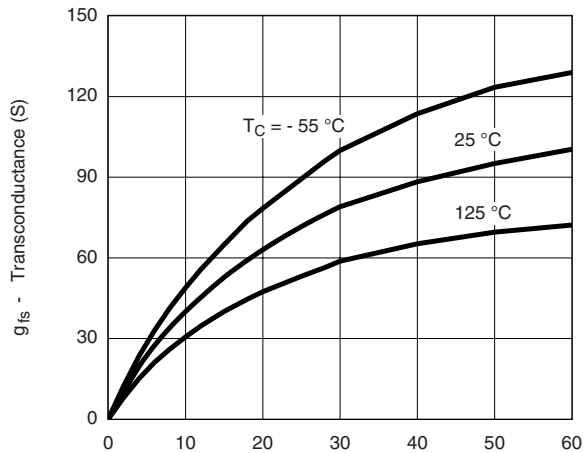
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted


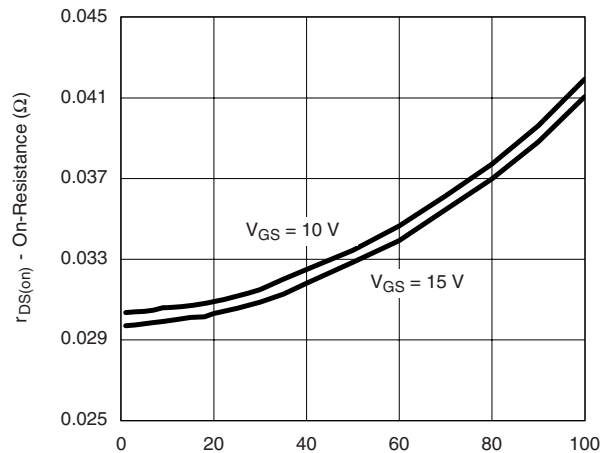
V_{DS} - Drain-to-Source Voltage (V)
Output Characteristics



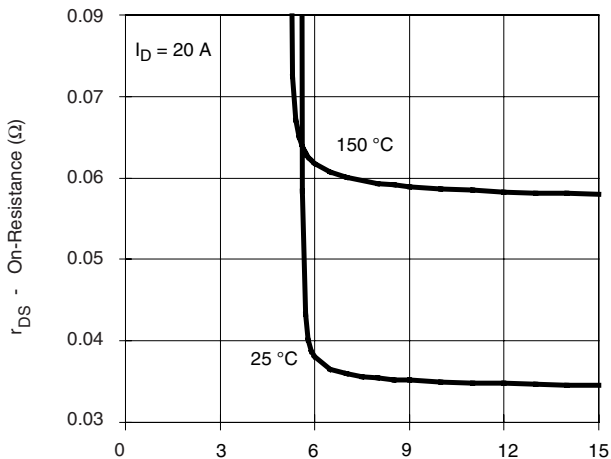
V_{GS} - Gate-to-Source Voltage (V)
Transfer Characteristics



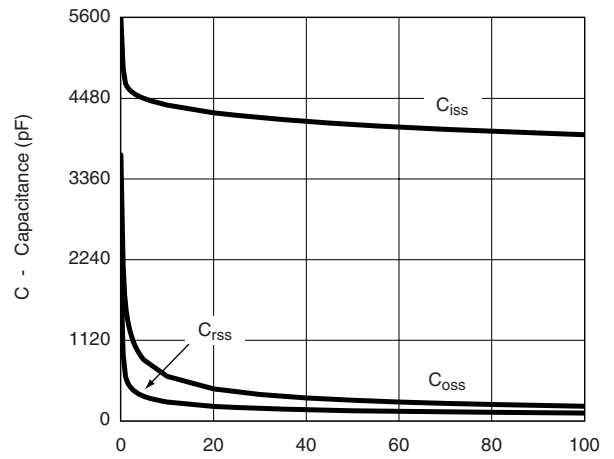
I_D - Drain Current (A)
Transconductance



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

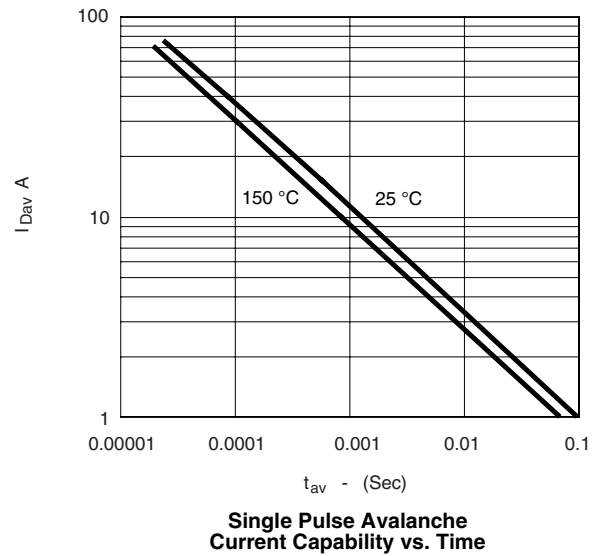
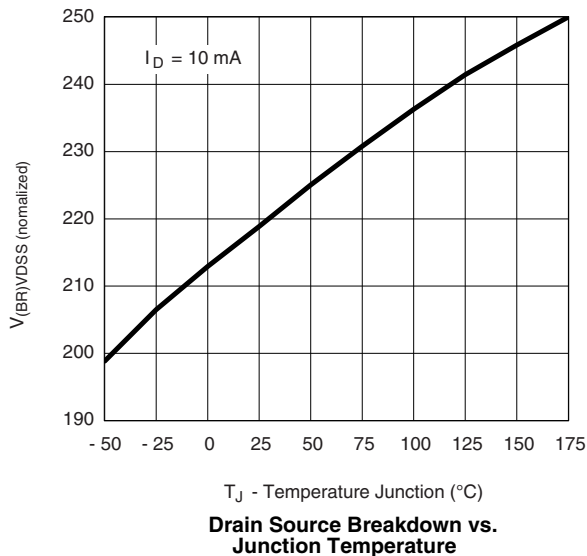
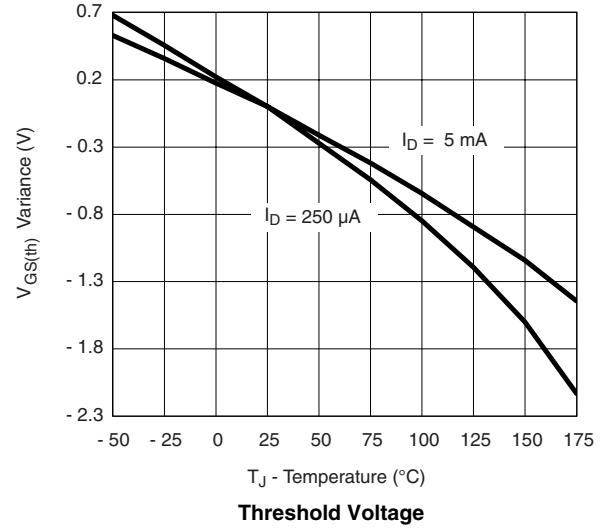
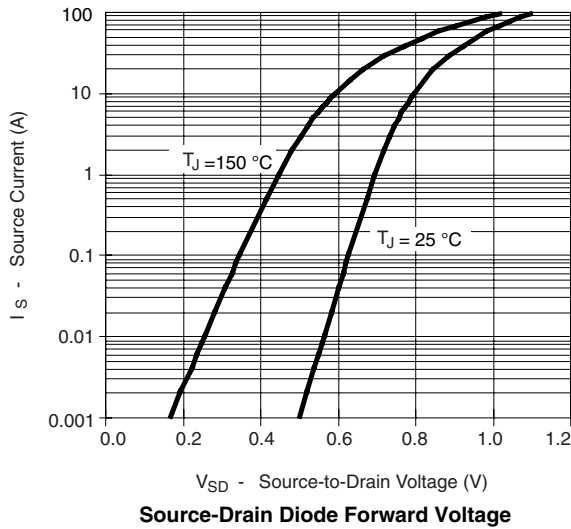
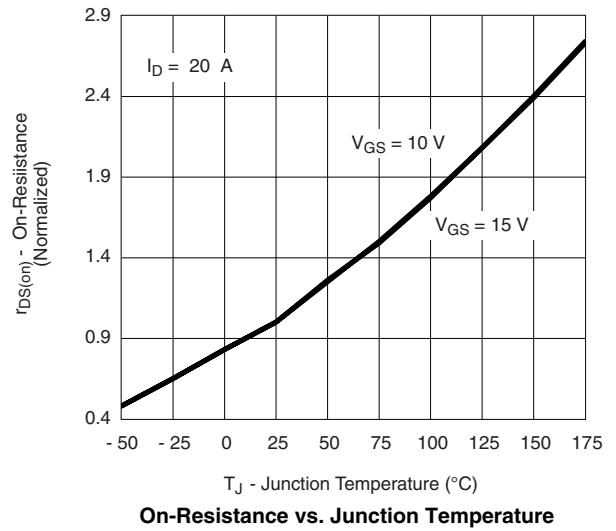
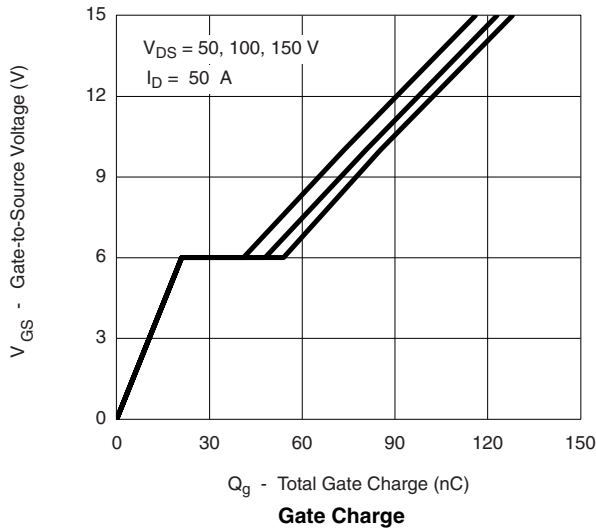


V_{GS} - Gate-to-Source Voltage (V)
On-Resistance vs. Gate-to-Source Voltage



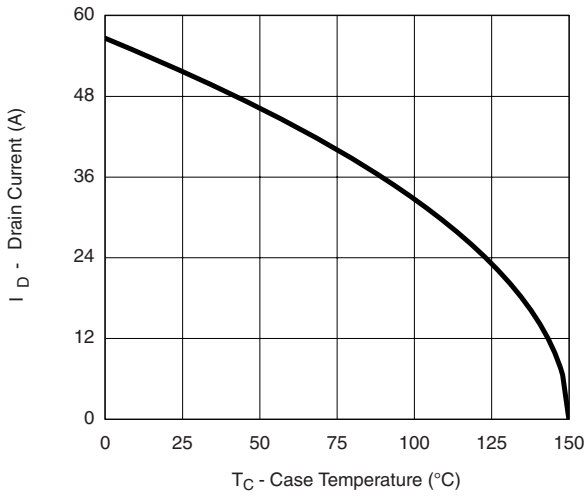
V_{DS} - Drain-to-Source Voltage (V)
Capacitance

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

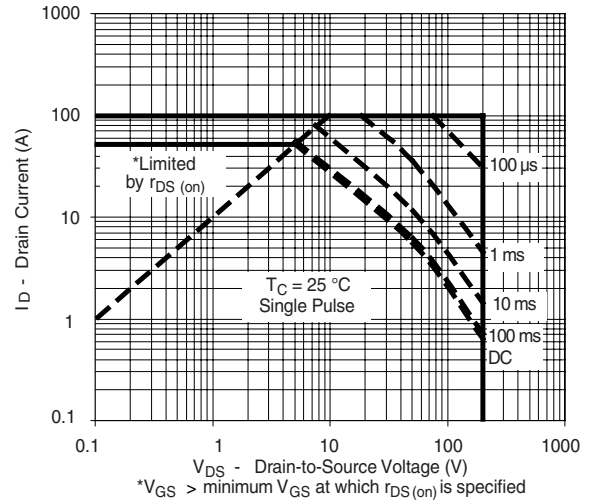




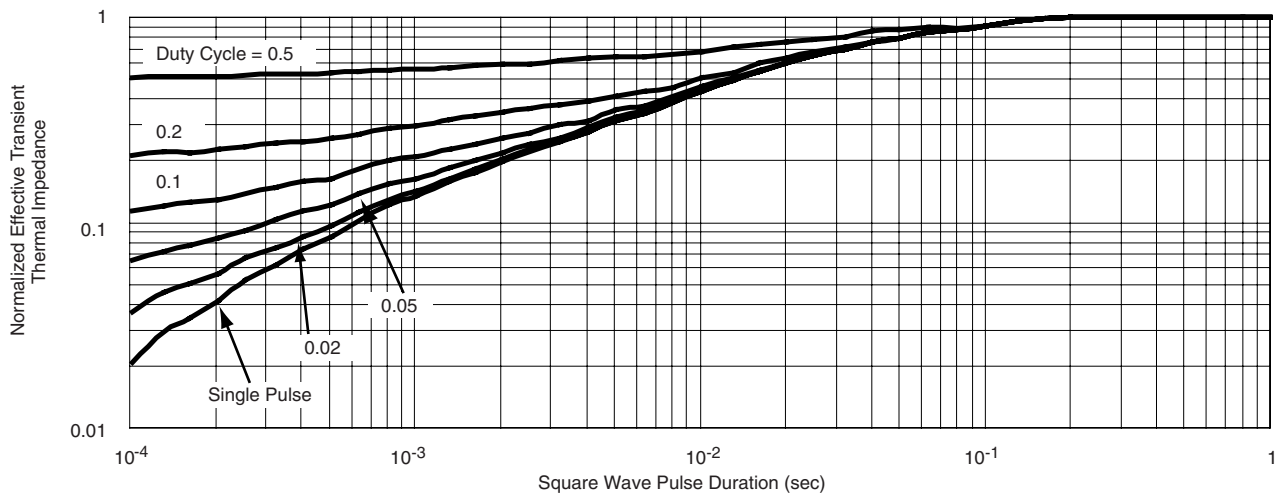
THERMAL RATINGS



Maximum Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see <http://www.vishay.com/ppg?74297>



Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.