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Vishay Siliconix

N-Channel 200 V (D-S) 175 °C MOSFET



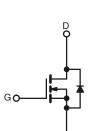
PRODUCT SUMMARY				
V _{DS} (V)	200			
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10 \text{ V}$	0.0216			
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 7.5 \text{ V}$	0.0235			
Q _g typ. (nC)	31.6			
I _D (A)	64			
Configuration	Single			

FEATURES

- ThunderFET® power MOSFET
- Low R_{DS} Q_g figure-of-merit (FOM)
- Maximum 175 °C junction temperature
- 100 % R_a and UIS tested
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>

APPLICATIONS

- Synchronous rectification
- Power supplies
- DC/AC inverter
- DC/DC converter
- · Solar micro inverter
- Motor drive switch



COMPLIANT

HALOGEN

FREE

N-Channel MOSFET

ORDERING INFORMATION			
Package	TO-220AB		
Lead (Pb)-free and halogen-free	SUP90220E-GE3		

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V _{DS}	200	
Gate-source voltage		V _{GS}	± 20	V
Continuous drain current	T _C = 25 °C		64	
	T _C = 125 °C	l _D	37	
Pulsed drain current (t = 100 μs)		I _{DM}	100	A
Continuous source-drain diode current		I _S	64.7	
Single pulse avalanche current ^a	. 0.411	I _{AS}	45	
Single pulse avalanche energy ^a	L = 0.1 mH	E _{AS}	101	mJ
Maximum power dissipation	T _C = 25 °C	Б	230 ^b	10/
	T _C = 125 °C	P _D	77 b	W
Operating junction and storage temperature range		T _J , T _{stg}	-55 to +175	
Soldering recommendations (peak temperature) c			260	°C

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	MAXIMUM	UNIT	
Maximum junction-to-ambient (PCB mount) c		R _{thJA}	40	°C/W	
Maximum junction-to-case (drain)	Steady state	R _{thJC}	0.65	C/W	

Notes

- a. Duty cycle $\leq 1 \%$.
- b. See SOA curve for voltage derating.
- c. When mounted on 1" square PCB (FR4 material).

ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishav.com/doc?91000



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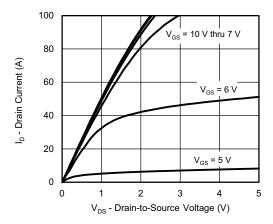
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Static							
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	200	-	-	V	
Gate-source threshold voltage	V _{GS(th)}	$V_{DS} = V_{GS}, I_D = 250 \mu A$	2	-	4	V	
Gate-source leakage	I _{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$	-	-	250	nA	
		$V_{DS} = 200 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	1	- μΑ	
Zero gate voltage drain current	I _{DSS}	$V_{DS} = 200 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 125 ^{\circ}\text{C}$	-	-	150		
		$V_{DS} = 200 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 175 ^{\circ}\text{C}$	-	-	5	mA	
On-state drain current ^a	I _{D(on)}	$V_{DS} \ge 10 \text{ V}, V_{GS} = 10 \text{ V}$	30	-	-	Α	
Drain-source on-state resistance a	D	$V_{GS} = 10 \text{ V}, I_D = 15 \text{ A}$	-	0.0180	0.0216	Ο.	
Dialii-Source oii-state resistance "	R _{DS(on)}	$V_{GS} = 7.5 \text{ V}, I_D = 10 \text{ A}$	-	0.0188	0.0235		
Forward transconductance ^a	9 _{fs}	$V_{DS} = 15 \text{ V}, I_D = 15 \text{ A}$	-	37	-	S	
Dynamic ^b							
Input capacitance	C _{iss}		-	1950	-	pF	
Output capacitance	C _{oss}	$V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	-	170	-		
Reverse transfer capacitance	C _{rss}		-	15	-		
Total gate charge	Qg		-	31.6	48	nC	
Gate-source charge	Q_{gs}	$V_{DS} = 100 \text{ V}, V_{GS} = 10 \text{ V}, I_{D} = 15 \text{ A}$	-	8.6	-		
Gate-drain charge	Q_{gd}		-	7.6	-		
Gate resistance	Rg	f = 1 MHz	0.6	3	6	Ω	
Turn-on delay time	t _{d(on)}		-	15	30		
Rise time	t _r	$V_{DD} = 100 \text{ V}, R_L = 8.3 \Omega, I_D \cong 12 \text{ A},$	-	35	53	no	
Turn-off delay time	t _{d(off)}	$V_{GEN} = 10 \text{ V}, R_g = 1 \Omega$	-	28	42	- ns -	
Fall time	t _f		-	38	57		
Drain-Source Body Diode Characteristi	cs						
Pulse diode forward current (t = 100 μs)	I _{SM}		-	-	100	Α	
Body diode voltage	V_{SD}	I _F = 12 A, V _{GS} = 0 V	-	0.85	1.5	V	
Body diode reverse recovery time	t _{rr}		-	120	180	ns	
Body diode reverse recovery charge	Q _{rr}	L_ = 12 A di/d+ = 100 A/vo	-	0.91	1.37	μC	
Reverse recovery fall time	t _a	I _F = 12 A, di/dt = 100 A/μs	-	95	-		
Reverse recovery rise time	t _b		-	25	-	ns	
Body diode peak reverse recovery charge	I _{RM(REC)}		-	12	18	Α	

Notes

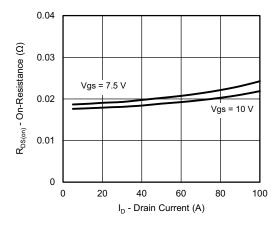
- a. Pulse test; pulse width $\leq 300~\mu s,$ duty cycle $\leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

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.

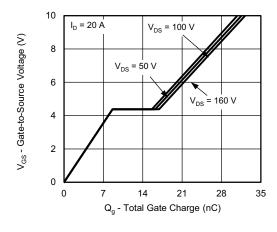




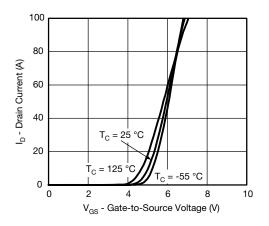
Output Characteristics



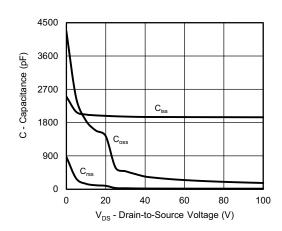
On-Resistance vs. Drain Current and Gate Voltage



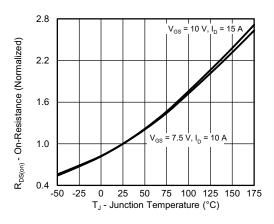
Gate Charge



Transfer Characteristics

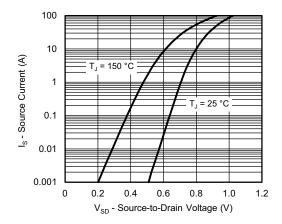


Capacitance

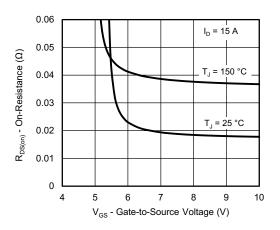


On-Resistance vs. Junction Temperature

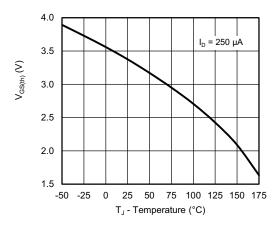




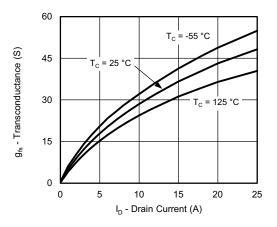
Source-Drain Diode Forward Voltage



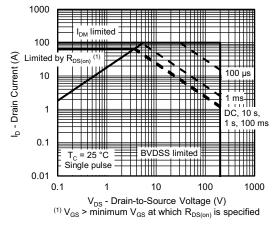
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

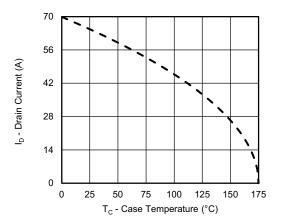


Transconductance

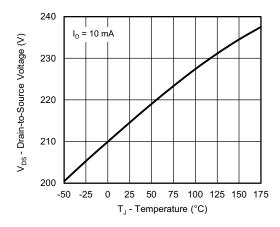


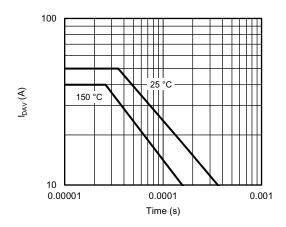
Safe Operating Area, Junction-to-Ambient





Current Derating a





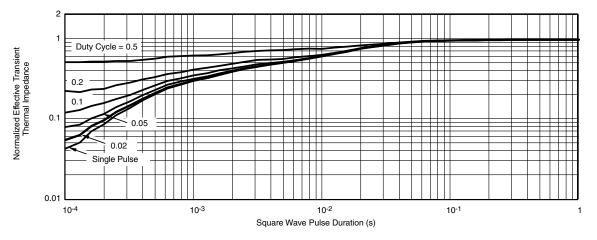
Drain Source Breakdown vs. Junction Temperature

 I_{DAV} vs. Time

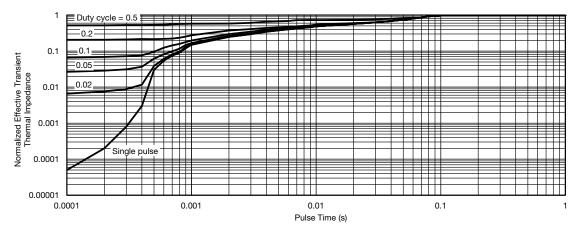
Note

a. The power dissipation P_D is based on T_J max. = 25 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.





Normalized Thermal Transient Impedance, Junction-to-Ambient



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 www.vishay.com/ppg?75261.



Vishay Siliconix

TO-220AB



	D2

	MILLIMETERS		INC	CHES	
DIM.	MIN.	MAX.	MIN.	MAX.	
А	4.25	4.65	0.167	0.183	
b	0.69	1.01	0.027	0.040	
b(1)	1.20	1.73	0.047	0.068	
С	0.36	0.61	0.014	0.024	
D	14.85	15.49	0.585	0.610	
D2	12.19	12.70	0.480	0.500	
Е	10.04	10.51	0.395	0.414	
е	2.41	2.67	0.095	0.105	
e(1)	4.88	5.28	0.192	0.208	
F	1.14	1.40	0.045	0.055	
H(1)	6.09	6.48	0.240	0.255	
J(1)	2.41	2.92	0.095	0.115	
L	13.35	14.02	0.526	0.552	
L(1)	3.32	3.82	0.131	0.150	
ØΡ	3.54	3.94	0.139	0.155	
Q	2.60	3.00	0.102	0.118	
ECN: T14-0413-Rev. P, 16-Jun-14 DWG: 5471					

Note

 $^{^{\}star}$ M = 1.32 mm to 1.62 mm (dimension including protrusion) Heatsink hole for HVM



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