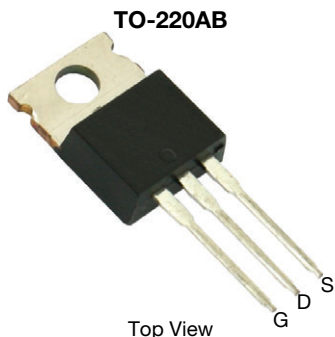


N-Channel 200 V (D-S) MOSFET



FEATURES

- TrenchFET® power MOSFET
- Maximum 175 °C junction temperature
- Very low Q_{gd} reduces power loss from passing through $V_{plateau}$
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Switching power supply
- DC/DC converter
- Power tools
- Motor drive switch
- DC/AC inverter
- Battery management
- OR-ing / e-fuse



N-Channel MOSFET

PRODUCT SUMMARY

V_{DS} (V)	200
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V	0.0109
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 7.5$ V	0.0124
Q_g typ. (nC)	56.7
I_D (A)	150 ^d
Configuration	Single

ORDERING INFORMATION

Package	TO-220
Lead (Pb)-free and halogen-free	SUP90100E-GE3

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}	± 20	
Continuous drain current ($T_J = 150$ °C)	I_D	150 ^d	A
		150 ^d	
Pulsed drain current ($t = 100$ μ s)	I_{DM}	250	
Avalanche current	I_{AS}	70	
Single avalanche energy ^a	E_{AS}	245	mJ
Maximum power dissipation ^a	P_D	375 ^b	W
		125 ^b	
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}	0.4	

Notes

- Duty cycle ≤ 1 %
- See SOA curve for voltage derating
- When mounted on 1" square PCB (FR4 material)
- Package limited



SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	200	-	-	V
Gate threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2	-	4	
Gate-body leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	± 250	nA
Zero gate voltage drain current	I _{DSS}	V _{DS} = 200 V, V _{GS} = 0 V	-	-	1	μA
		V _{DS} = 200 V, V _{GS} = 0 V, T _J = 125 °C	-	-	150	
		V _{DS} = 200 V, V _{GS} = 0 V, T _J = 175 °C	-	-	5	mA
On-state drain current ^a	I _{D(on)}	V _{DS} ≥ 10 V, V _{GS} = 10 V	120	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 16 A	-	0.0091	0.0109	Ω
		V _{GS} = 7.5 V, I _D = 13 A	-	0.0095	0.0124	
Forward transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 13 A	-	85	-	S
Dynamic ^b						
Input capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 100 V, f = 1 MHz	-	3930	-	pF
Output capacitance	C _{oss}		-	450	-	
Reverse transfer capacitance	C _{rss}		-	12	-	
Total gate charge ^c	Q _g	V _{DS} = 100 V, V _{GS} = 10 V, I _D = 16 A	-	72.8	110	nC
Gate-source charge ^c	Q _{gs}		-	19.4	-	
Gate-drain charge ^c	Q _{gd}		-	19.0	-	
Gate resistance	R _g	f = 1 MHz	0.7	3.5	7.0	Ω
Turn-on delay time ^c	t _{d(on)}	V _{DD} = 80 V, R _L = 6.2 Ω I _D ≅ 13 A, V _{GEN} = 10 V, R _g = 1 Ω	-	20	40	ns
Rise time ^c	t _r		-	50	100	
Turn-off delay time ^c	t _{d(off)}		-	60	120	
Fall time ^c	t _f		-	18	36	
Drain-Source Body Diode Ratings and Characteristics ^b (T _C = 25 °C)						
Pulsed current (t = 100 μs)	I _{SM}		-	-	250	A
Forward voltage ^a	V _{SD}	I _F = 10 A, V _{GS} = 0 V	-	0.8	1.5	V
Reverse recovery time	t _{rr}	I _F = 13 A, di/dt = 100 A/μs	-	118	177	ns
Peak reverse recovery charge	I _{RM(REC)}		-	9.4	14.1	A
Reverse recovery charge	Q _{rr}		-	0.632	0.948	μC
Reverse recovery fall time	t _a		-	94	-	ns
Reverse recovery rise time	t _b		-	24	-	

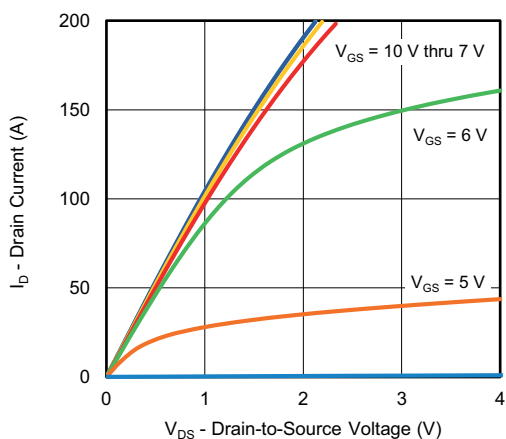
Notes

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

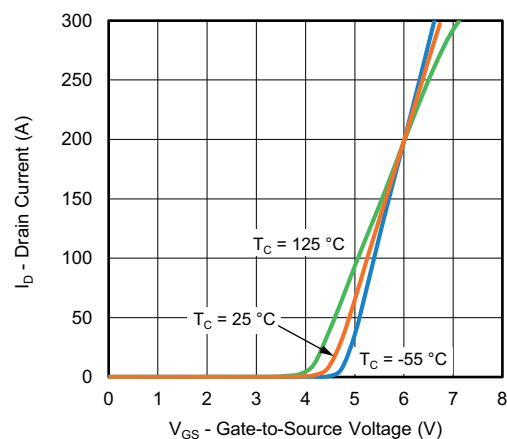
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



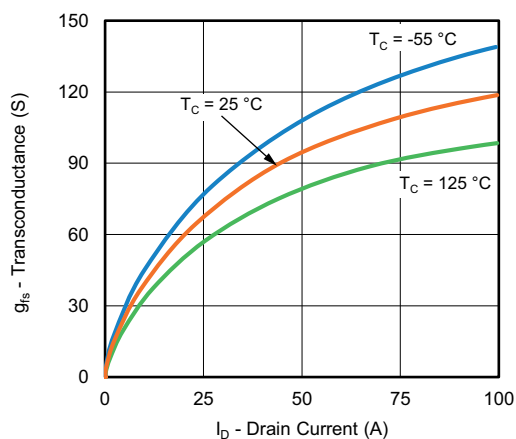
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



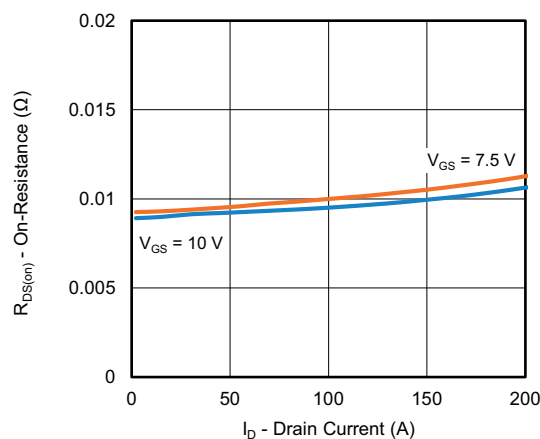
Output Characteristics



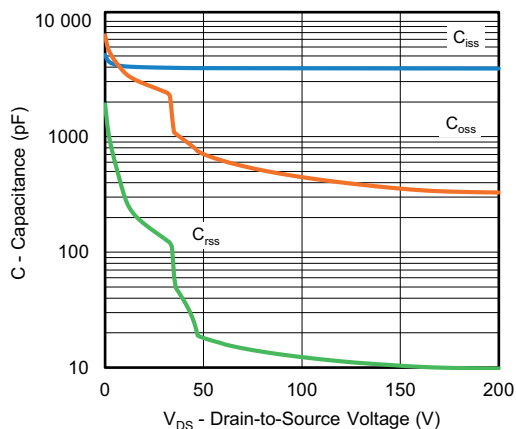
Transfer Characteristics



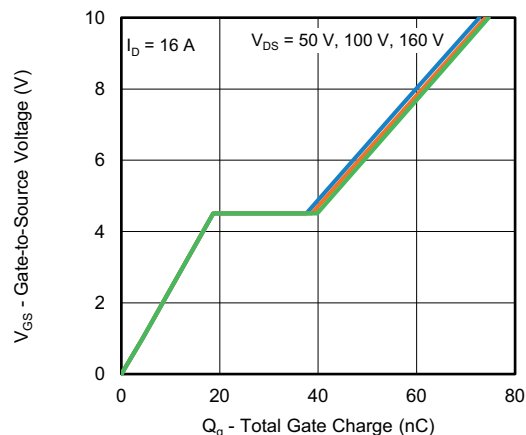
Transconductance



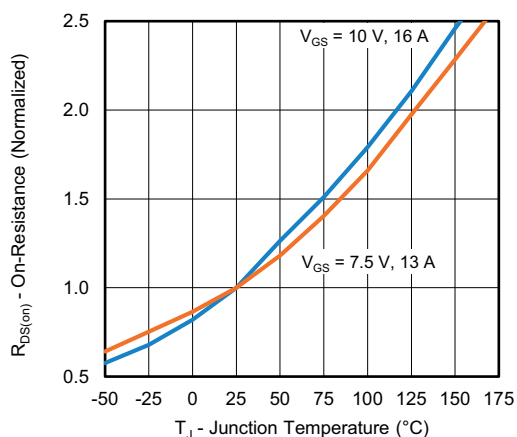
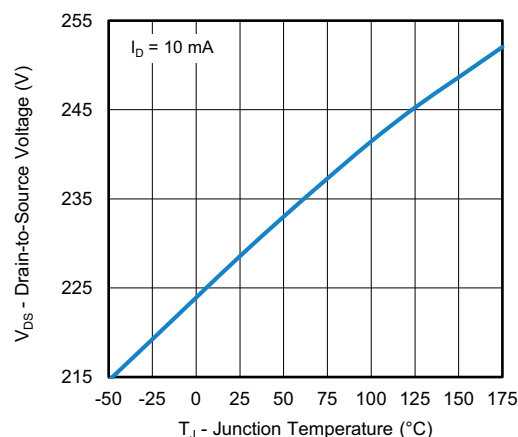
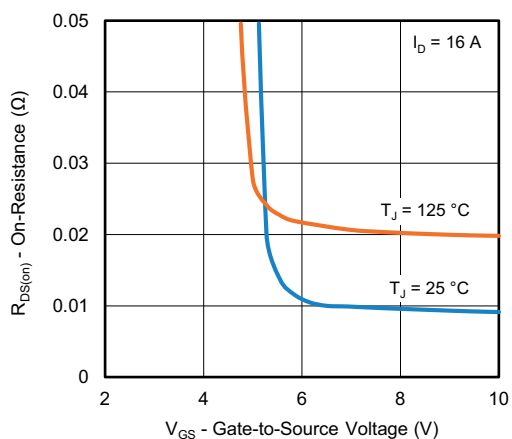
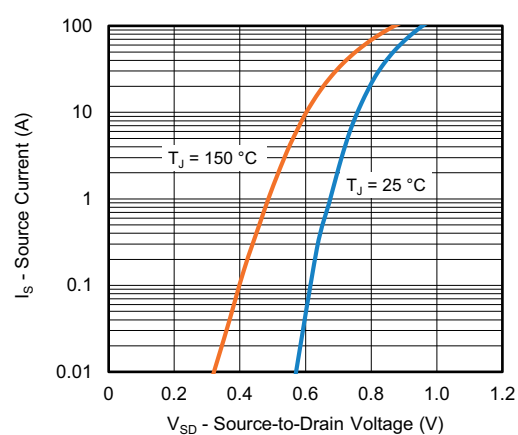
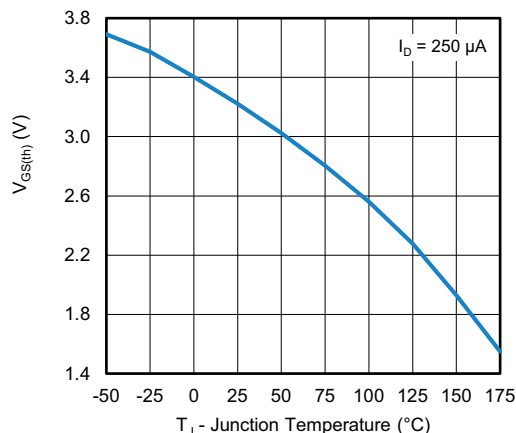
On-Resistance vs. Drain Current



Capacitance

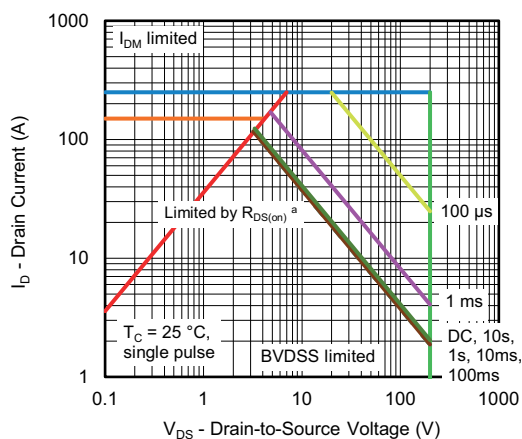


Gate Charge

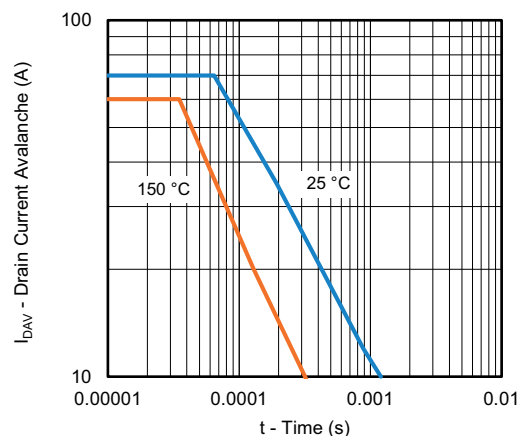
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

On-Resistance vs. Junction Temperature

Drain Source Breakdown vs. Junction Temperature

On-Resistance vs. Gate-to-Source Voltage

Source Drain Diode Forward Voltage

Threshold Voltage



THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



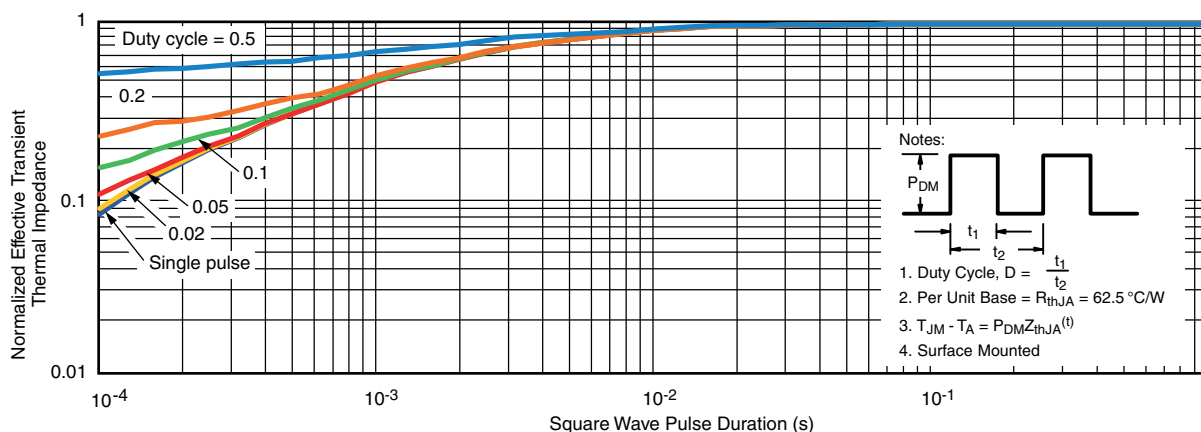
Safe Operating Area



Single Pulse Avalanche Current Capability vs. Time

Note

a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



Normalized Thermal Transient Impedance, Junction-to-Case

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TO-220AB

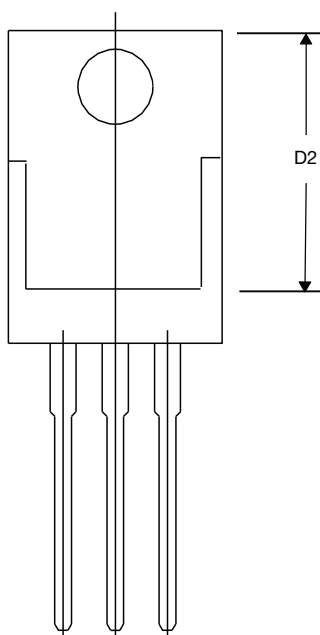


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
D2	12.19	12.70	0.480	0.500
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	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
Ø P	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

* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM





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