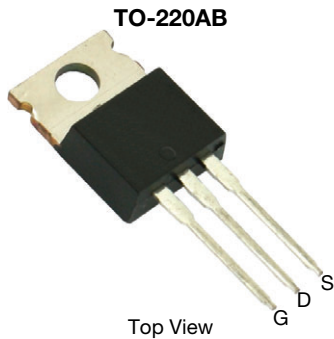


N-Channel 200 V (D-S) MOSFET



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

FEATURES

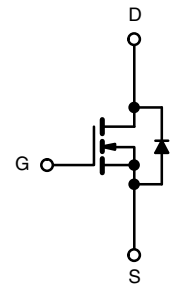
- TrenchFET® power MOSFET
- Maximum 175 °C junction temperature
- Very low Q_{gd} reduces power loss from passing through $V_{plateau}$
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



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

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	$T_C = 25$ °C	150 ^d
		$T_C = 70$ °C	150 ^d
Pulsed drain current ($t = 100$ μ s)	I_{DM}	250	A
Avalanche current	I_{AS}	70	
Single avalanche energy ^a	E_{AS}	245	mJ
Maximum power dissipation ^a	P_D	$T_C = 25$ °C	375 ^b
		$T_C = 125$ °C	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



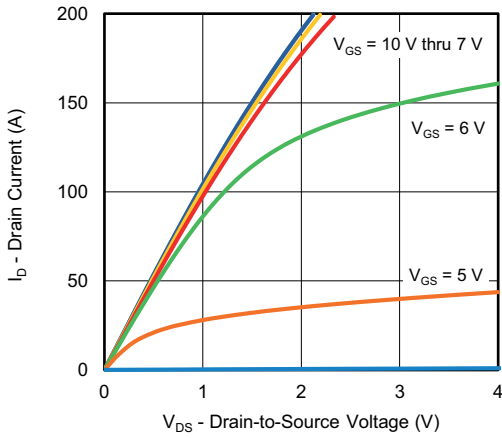
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	200	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2	-	4	
Gate-body leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$	-	-	± 250	nA
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 200\text{ V}$, $V_{GS} = 0\text{ V}$	-	-	1	μA
		$V_{DS} = 200\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$	-	-	150	
		$V_{DS} = 200\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 175\text{ }^\circ\text{C}$	-	-	5	mA
On-state drain current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}$, $V_{GS} = 10\text{ V}$	120	-	-	A
Drain-source on-state resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 16\text{ A}$	-	0.0091	0.0109	Ω
		$V_{GS} = 7.5\text{ V}$, $I_D = 13\text{ A}$	-	0.0095	0.0124	
Forward transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 13\text{ A}$	-	85	-	S
Dynamic ^b						
Input capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 100\text{ V}$, $f = 1\text{ MHz}$	-	3930	-	μF
Output capacitance	C_{oss}		-	450	-	
Reverse transfer capacitance	C_{rss}		-	12	-	
Total gate charge ^c	Q_g	$V_{DS} = 100\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 16\text{ A}$	-	72.8	110	nC
Gate-source charge ^c	Q_{gs}		-	19.4	-	
Gate-drain charge ^c	Q_{gd}		-	19.0	-	
Gate resistance	R_g	$f = 1\text{ MHz}$	0.7	3.5	7.0	Ω
Turn-on delay time ^c	$t_{d(on)}$	$V_{DD} = 80\text{ V}$, $R_L = 6.2\text{ }\Omega$ $I_D \cong 13\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$	-	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 ($T_C = 25\text{ }^\circ\text{C}$)						
Pulsed current ($t = 100\text{ }\mu\text{s}$)	I_{SM}		-	-	250	A
Forward voltage ^a	V_{SD}	$I_F = 10\text{ A}$, $V_{GS} = 0\text{ V}$	-	0.8	1.5	V
Reverse recovery time	t_{rr}	$I_F = 13\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$	-	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

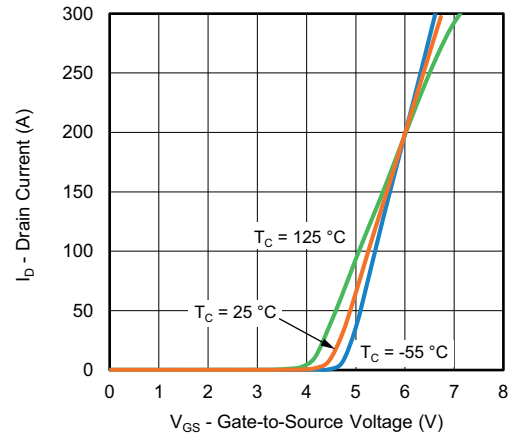
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
- Guaranteed by design, not subject to production testing
- Independent of operating temperature

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.

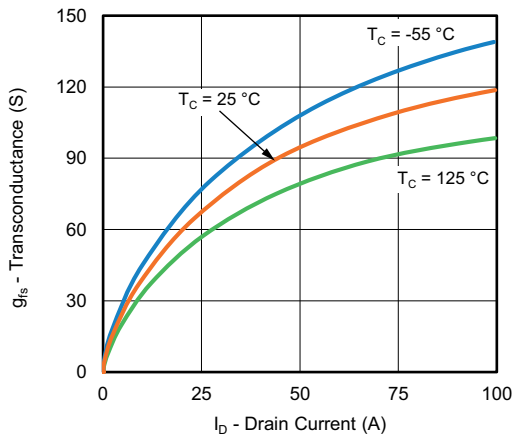
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



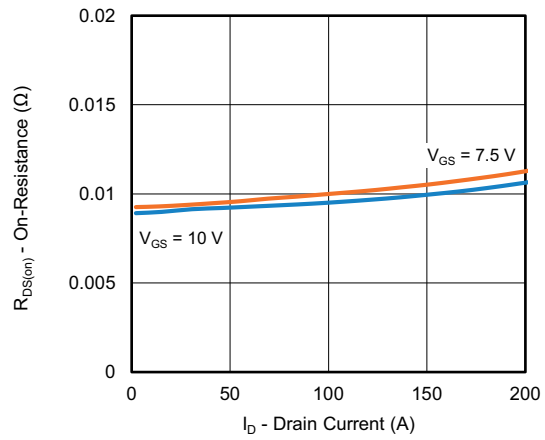
Output Characteristics



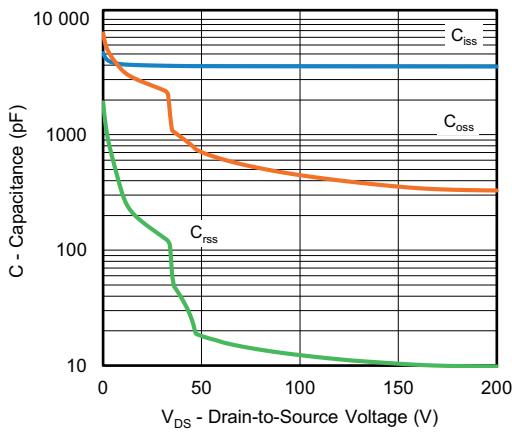
Transfer Characteristics



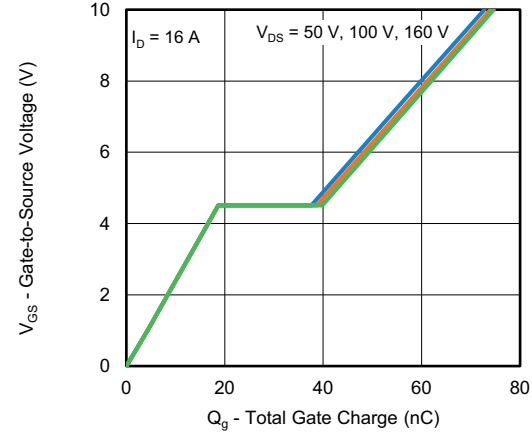
Transconductance



On-Resistance vs. Drain Current



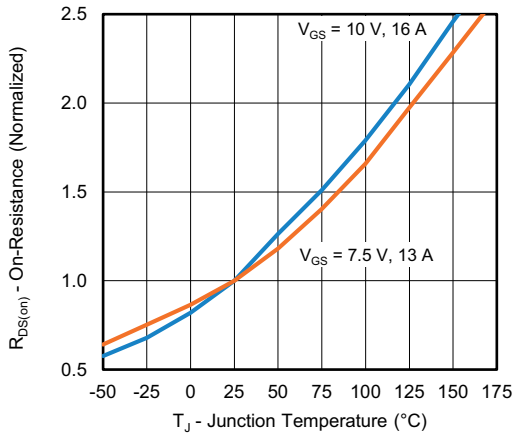
Capacitance



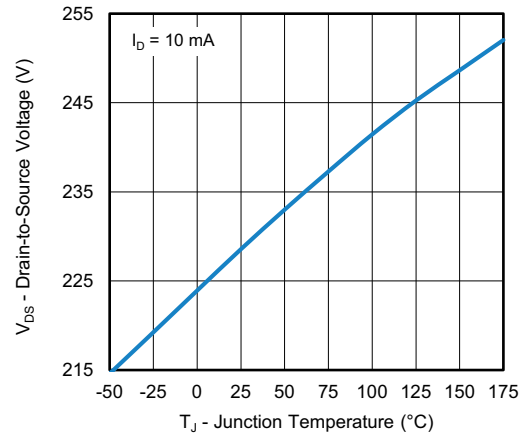
Gate Charge



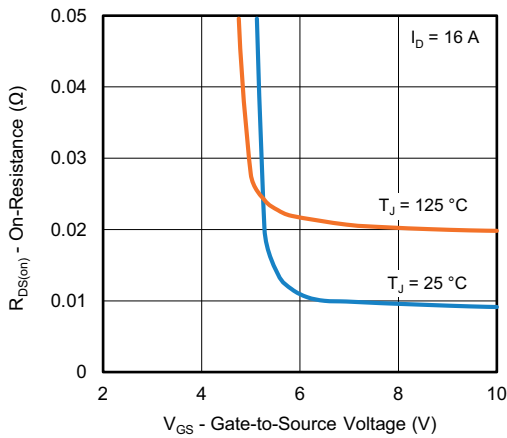
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



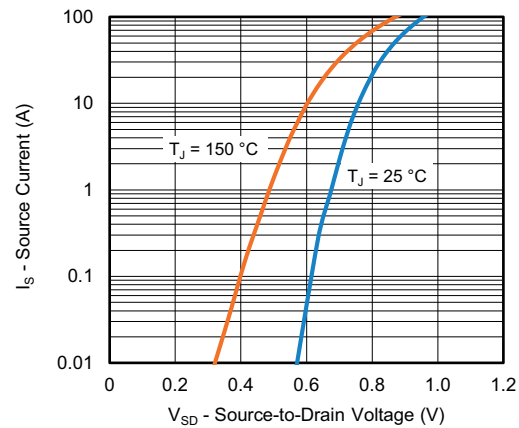
On-Resistance vs. Junction Temperature



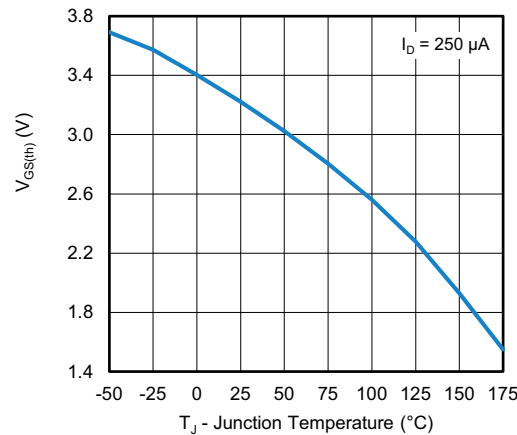
Drain Source Breakdown vs. Junction Temperature



On-Resistance vs. Gate-to-Source Voltage



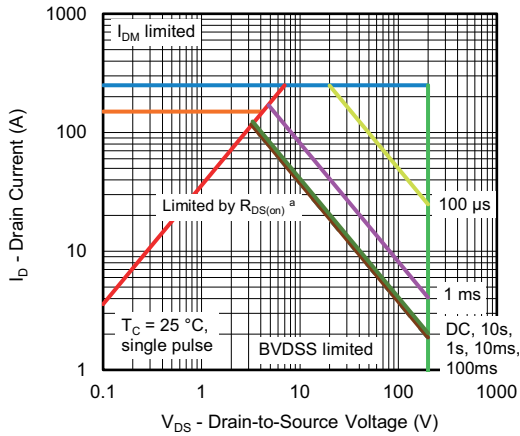
Source Drain Diode Forward Voltage



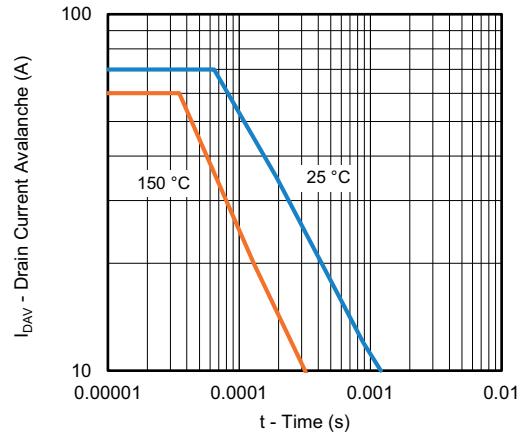
Threshold Voltage



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



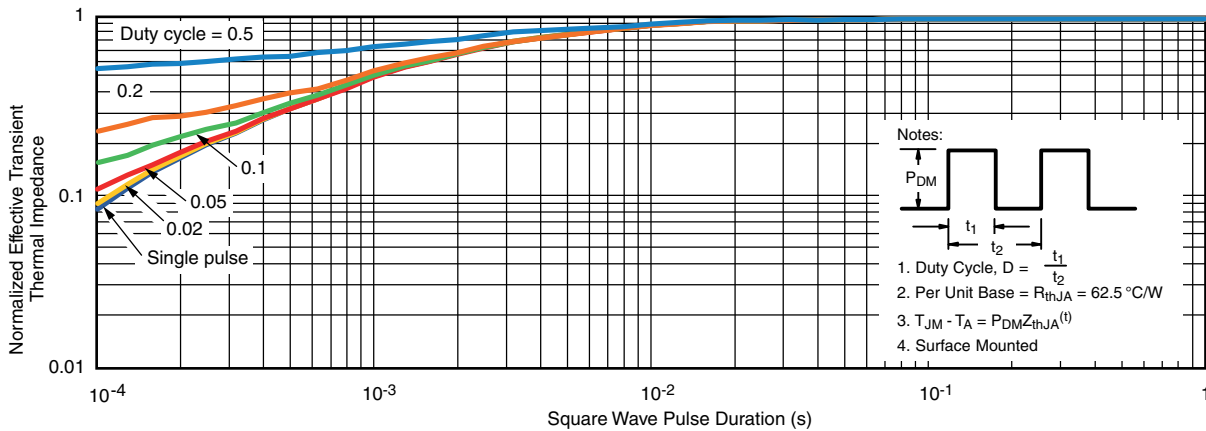
Safe Operating Area



Single Pulse Avalanche Current Capability vs. Time

Note

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

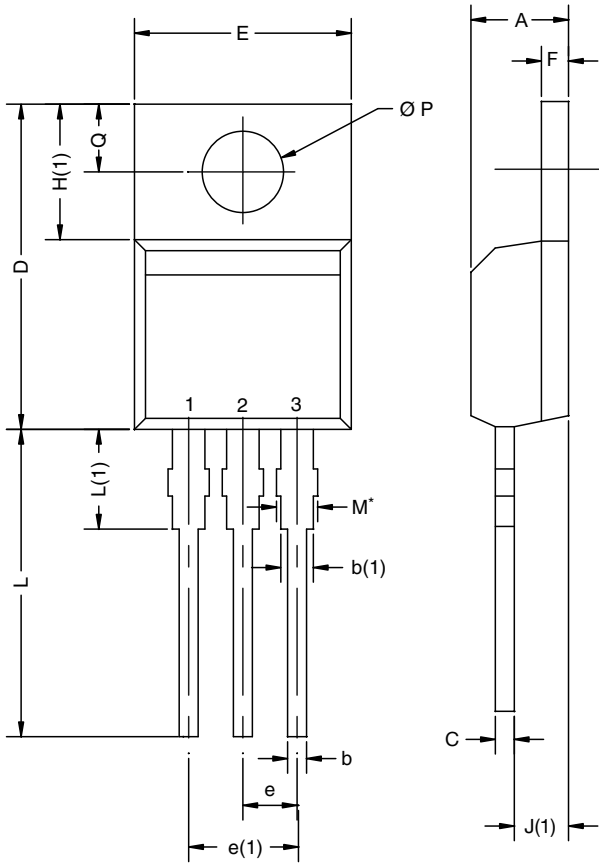


Normalized Thermal Transient Impedance, Junction-to-Case

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TO-220AB

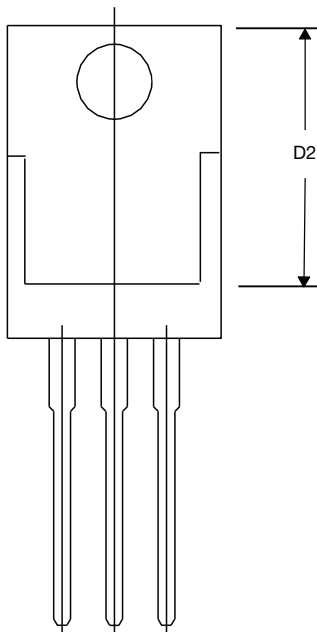


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
D2	12.19	12.70	0.480	0.500
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)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