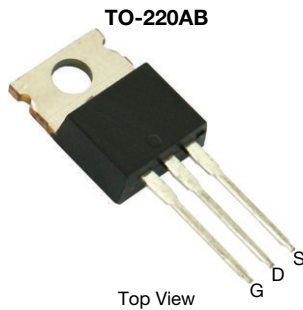


N-Channel 200 V (D-S) 175 °C MOSFET



PRODUCT SUMMARY	
V_{DS} (V)	200
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V	0.0152
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 7.5$ V	0.0169
Q_g typ. (nC)	58
I_D (A)	90
Configuration	Single

FEATURES

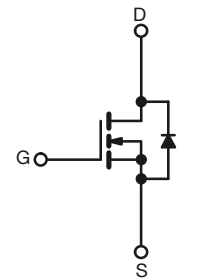
- ThunderFET® power MOSFET
- Tuned for the lowest $R_{DS} - Q_{oss}$ FOM
- Maximum 175 °C junction temperature
- 100 % R_g and UIS tested
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Power supplies:
 - Uninterruptible power supplies
 - AC/DC switch-mode power supplies
 - Lighting
- Synchronous rectification
- DC/DC converter
- Motor drive switch
- DC/AC inverter
- Solar micro inverter
- Class D audio amplifier



N-Channel MOSFET

ORDERING INFORMATION	
Package	TO-220AB
Lead (Pb)-free and halogen-free	SUP90142E-GE3

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	200	V
Gate-source voltage	V_{GS}	± 20	
Continuous drain current	I_D	$T_C = 25$ °C	90
		$T_C = 125$ °C	52
Pulsed drain current ($t = 100$ μ s)	I_{DM}	240	A
Continuous source-drain diode current	I_S	90	
Single pulse avalanche current ^a	I_{AS}	60	mJ
Single pulse avalanche energy ^a			
Maximum power dissipation	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
Soldering recommendations (peak temperature) ^c		260	

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}	0.4	

Notes

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



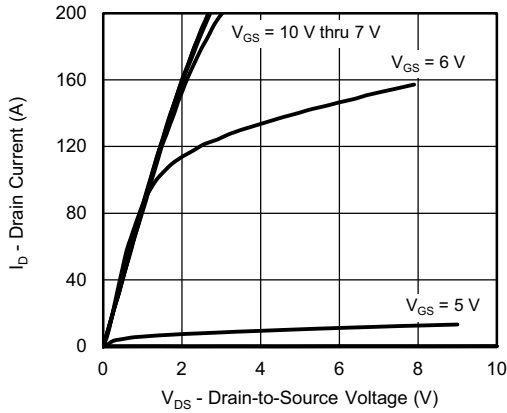
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	200	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2	-	4	V
Gate-source 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	μA
		$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	-	5	mA
On-state drain current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	60	-	-	A
Drain-source on-state resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$	-	0.0126	0.0152	Ω
		$V_{GS} = 7.5\text{ V}, I_D = 30\text{ A}$	-	0.0133	0.0169	Ω
Forward transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 30\text{ A}$	-	63	-	S
Dynamic ^b						
Input capacitance	C_{iss}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	-	3120	-	μF
Output capacitance	C_{oss}		-	280	-	
Reverse transfer capacitance	C_{rss}		-	24	-	
Total gate charge	Q_g	$V_{DS} = 100\text{ V}, V_{GS} = 10\text{ V}, I_D = 60\text{ A}$	-	58	87	nC
Gate-source charge	Q_{gs}		-	17.6	-	
Gate-drain charge	Q_{gd}		-	17.2	-	
Output charge	Q_{oss}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	-	108	162	
Gate resistance	R_g	$f = 1\text{ MHz}$	1.5	3	5	Ω
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 100\text{ V}, R_L = 1.66\text{ }\Omega, I_D \cong 60\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$	-	14	28	ns
Rise time	t_r		-	125	250	
Turn-off delay time	$t_{d(off)}$		-	27	54	
Fall time	t_f		-	80	150	
Drain-Source Body Diode Characteristics						
Pulse diode forward current ($t = 100\text{ }\mu\text{s}$)	I_{SM}		-	-	240	A
Body diode voltage	V_{SD}	$I_F = 30\text{ A}, V_{GS} = 0\text{ V}$	-	0.85	1.5	V
Body diode reverse recovery time	t_{rr}	$I_F = 30\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$	-	150	300	ns
Body diode reverse recovery charge	Q_{rr}		-	0.9	1.8	nC
Reverse recovery fall time	t_a		-	125	-	ns
Reverse recovery rise time	t_b		-	25	-	
Body diode peak reverse recovery charge	$I_{RM(REC)}$		-	11.5	20	A

Notes

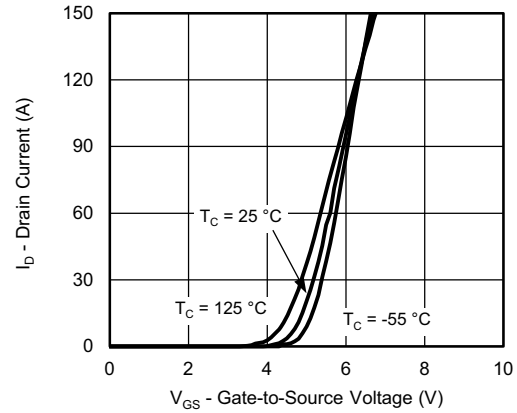
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

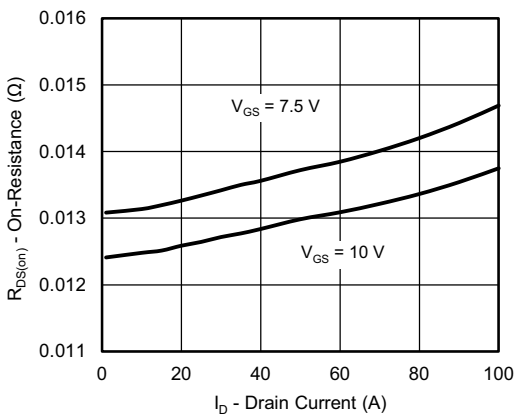
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



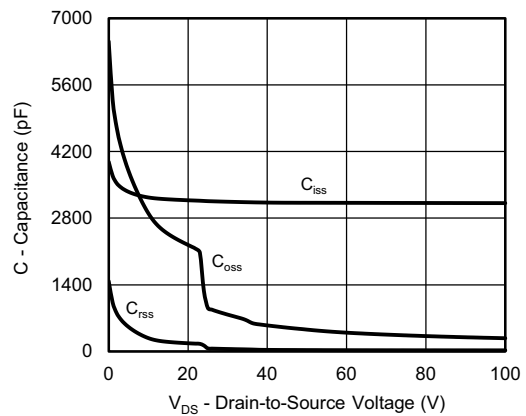
Output Characteristics



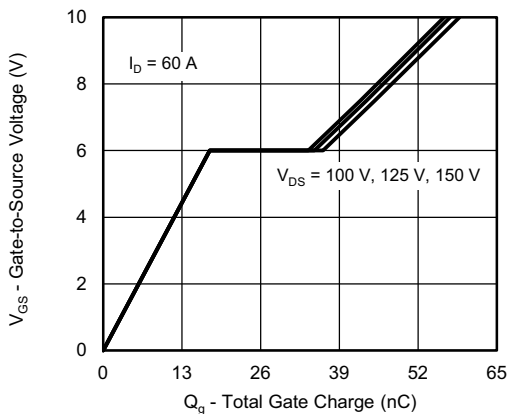
Transfer Characteristics



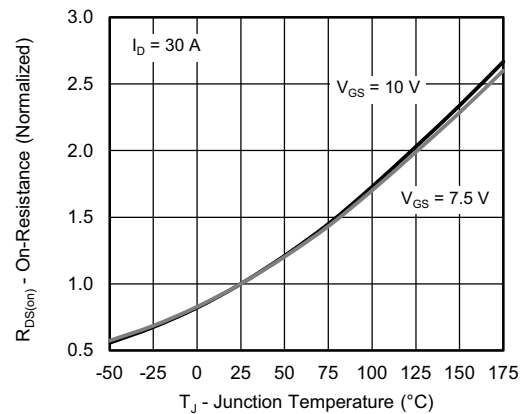
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



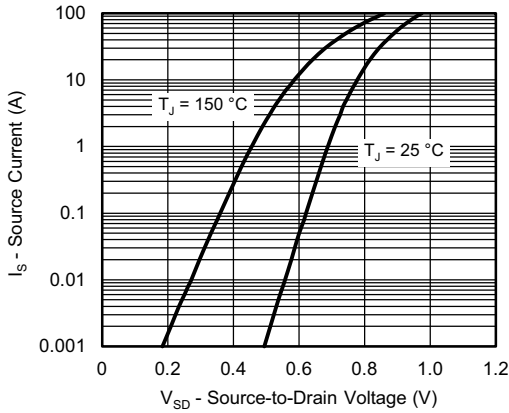
Gate Charge



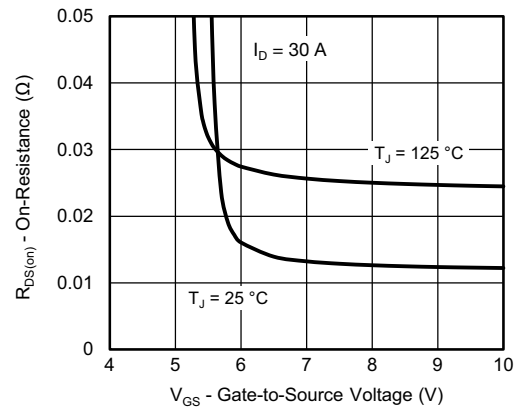
On-Resistance vs. Junction Temperature



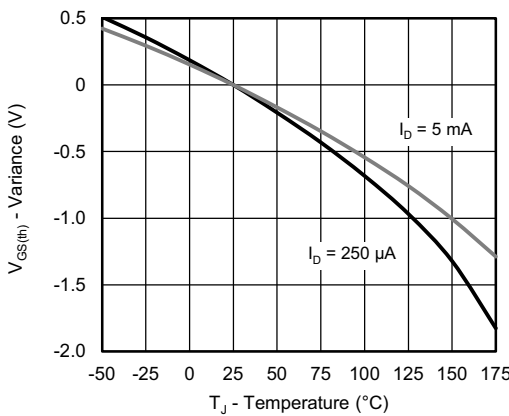
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



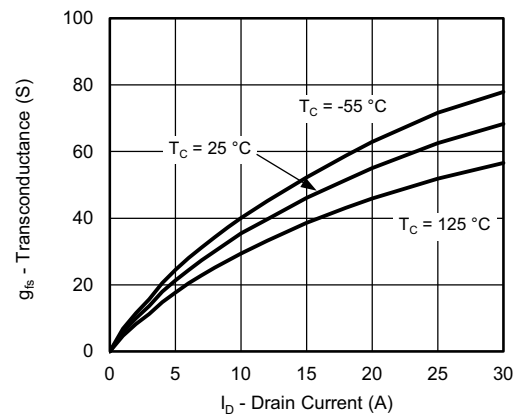
Source-Drain Diode Forward Voltage



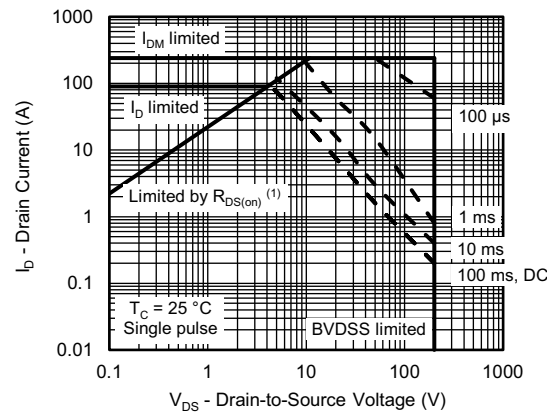
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



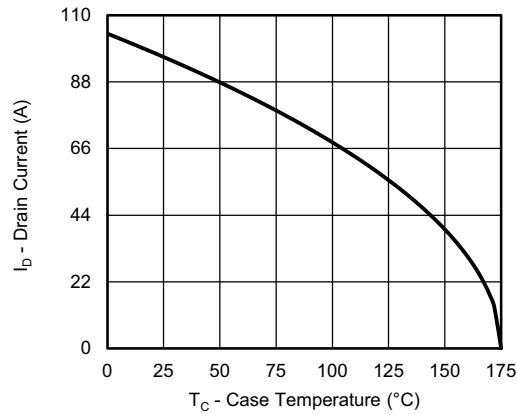
Transconductance



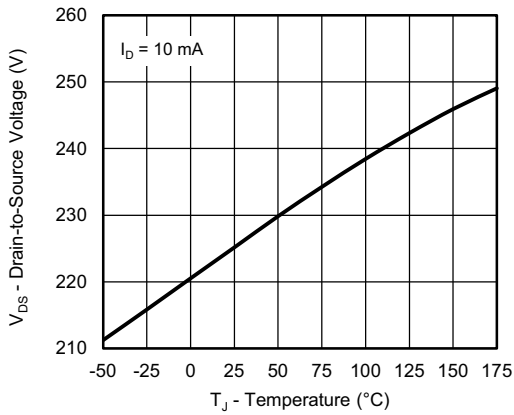
Safe Operating Area, Junction-to-Ambient



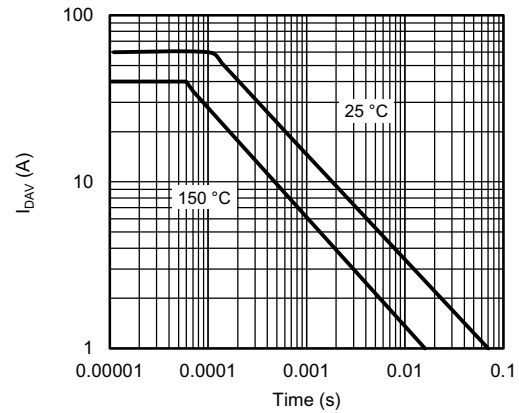
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating ^a



Drain Source Breakdown vs. Junction Temperature



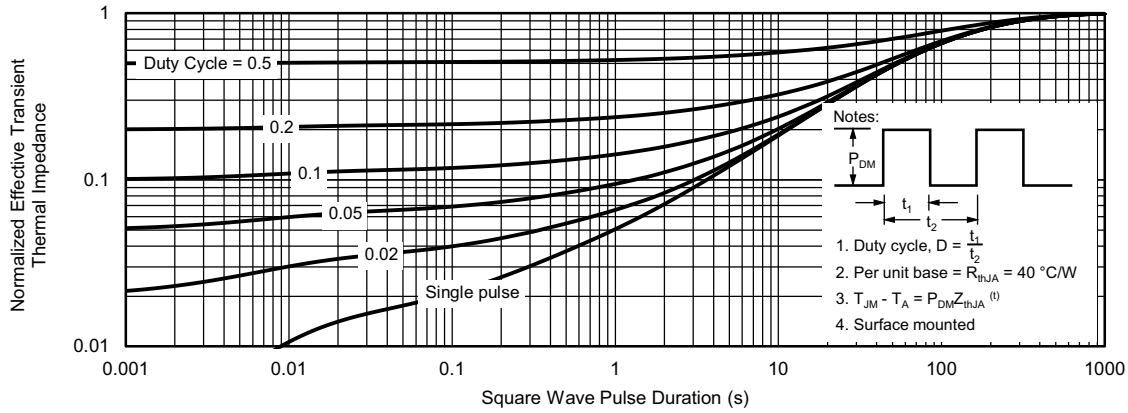
I_{DAV} vs. Time

Note

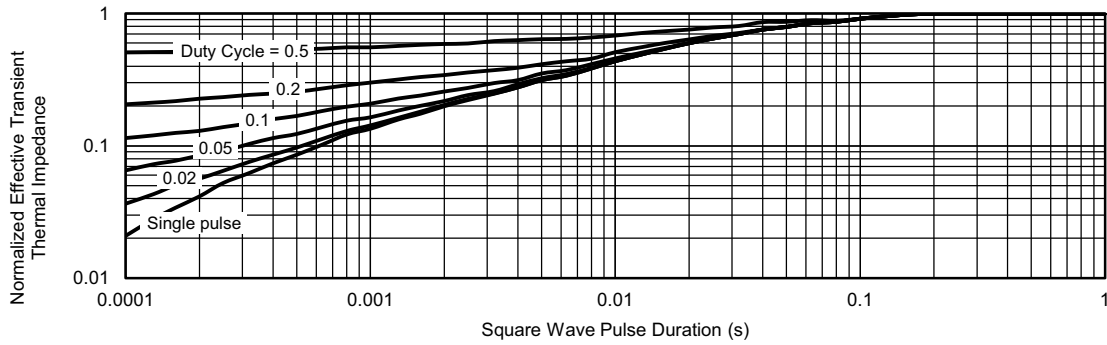
- a. The power dissipation P_D is based on T_J max. = 25 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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