

## N-Channel 100-V (D-S) MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)	$Q_g$ (Typ.)
100	0.0183 at $V_{GS} = 10$ V	60	48
	0.023 at $V_{GS} = 8.0$ V	53	

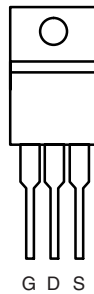
### FEATURES

- TrenchFET<sup>®</sup> Power MOSFET
- 100 %  $R_g$  and UIS Tested
- Compliant to RoHS Directive 2002/95/EC

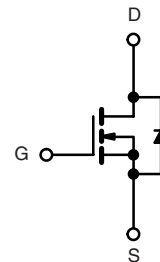

**RoHS**  
COMPLIANT

### APPLICATIONS

- Industrial
- Power Supply

**TO-220AB**


Top View

**Ordering Information:** SUP60N10-18P-E3 (Lead (Pb)-free)


N-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS $T_C = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175$ °C)	$I_D$	$T_C = 25$ °C	60
		$T_C = 70$ °C	50
Pulsed Drain Current	$I_{DM}$	100	A
Avalanche Current	$I_{AS}$	45	
Single Avalanche Energy <sup>a</sup>	$E_{AS}$	101	mJ
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_C = 25$ °C	150 <sup>b</sup>
		$T_A = 25$ °C <sup>c</sup>	3.75
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) <sup>c</sup>	$R_{thJA}$	40	°C/W
Junction-to-Case (Drain)	$R_{thJC}$	1.0	

Notes:

 a. Duty cycle  $\leq 1$  %.

b. See SOA curve for voltage derating.

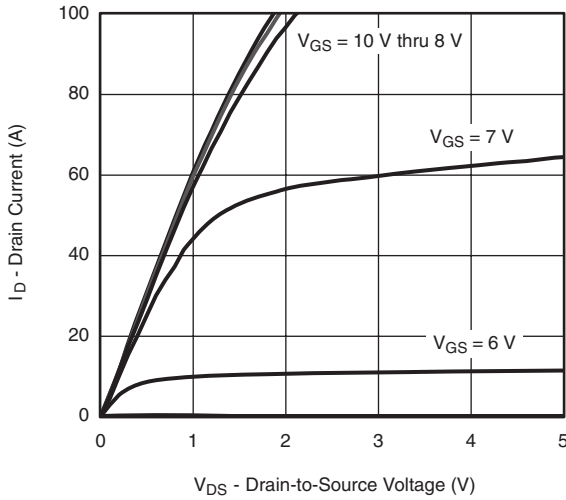
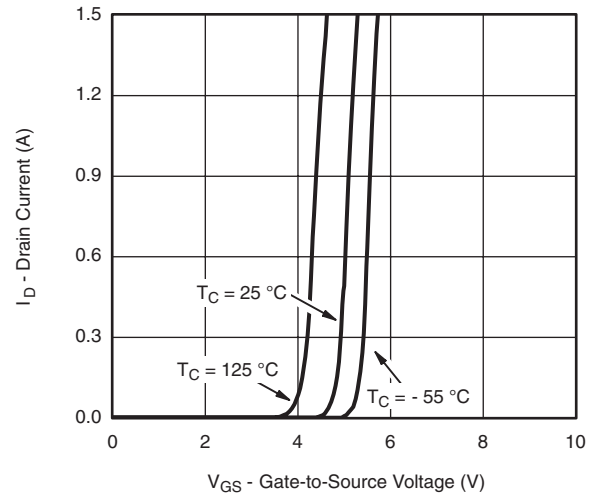
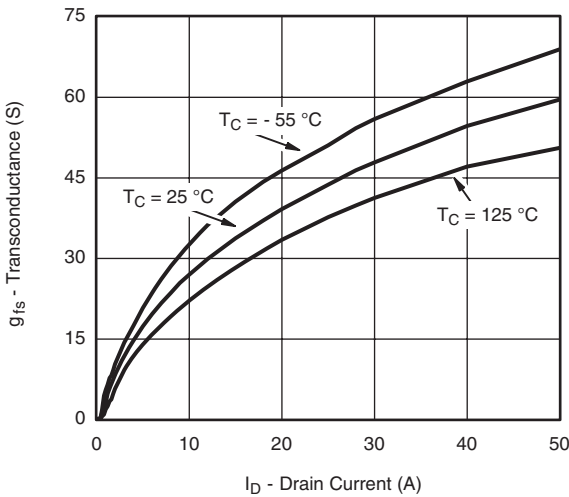
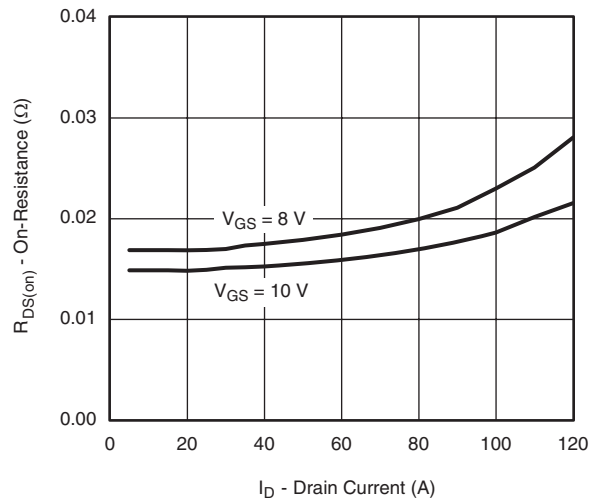
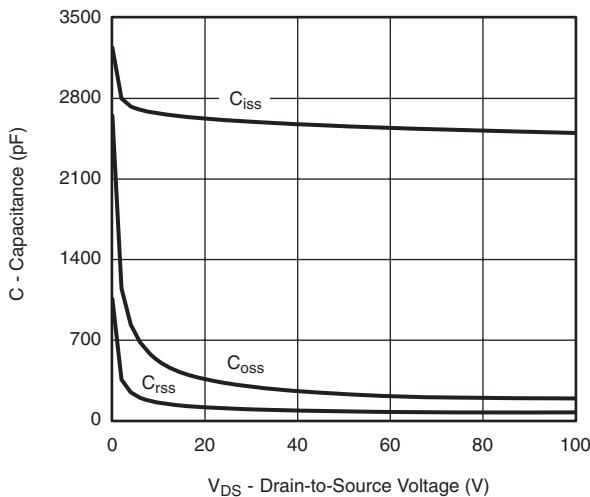
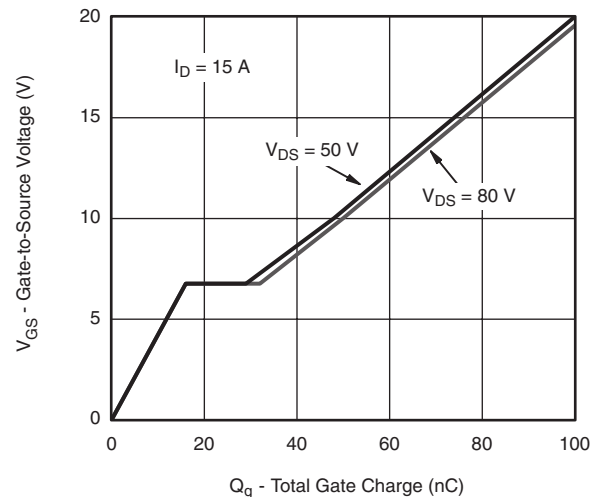
c. When Mounted on 1" square PCB (FR-4 material).

<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{DS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100			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	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 250$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			250	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	50			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$		0.015	0.0183	$\Omega$
		$V_{GS} = 10\text{ V}, I_D = 15\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.027	0.033	
		$V_{GS} = 8.0\text{ V}, I_D = 10\text{ A}$		0.018	0.023	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 15\text{ A}$		33		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}, f = 1\text{ MHz}$		2600		$\mu\text{F}$
Output Capacitance	$C_{oss}$			230		
Reverse Transfer Capacitance	$C_{rss}$			80		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V}, I_D = 50\text{ A}$		48	75	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			16		
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			13		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$	0.25	1.1	2.4	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 50\text{ V}, R_L = 1.0\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		12	20	ns
Rise Time <sup>c</sup>	$t_r$			10	20	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			18	35	
Fall Time <sup>c</sup>	$t_f$			8	15	
<b>Drain-Source Body Diode Characteristics</b> $T_C = 25\text{ }^\circ\text{C}$ <sup>b</sup>						
Continuous Current	$I_S$				60	A
Pulsed Current	$I_{SM}$				100	
Forward Voltage <sup>a</sup>	$V_{SD}$	$I_F = 15\text{ A}, V_{GS} = 0\text{ V}$		0.85	1.5	V
Reverse Recovery Time	$t_{rr}$	$I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		80	120	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			4		A
Reverse Recovery Charge	$Q_{rr}$			160	240	nC

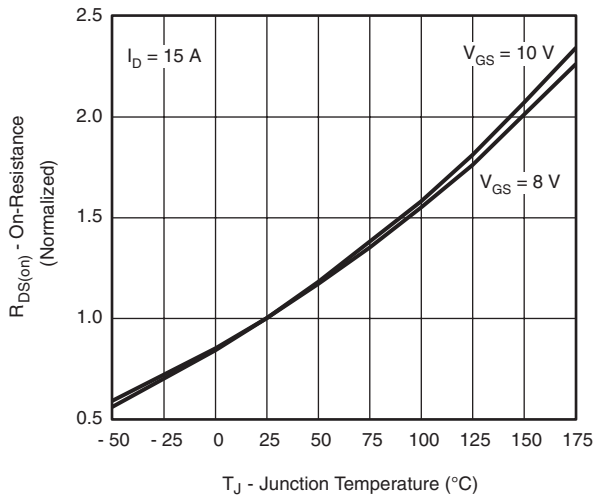
**Notes:**

- 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.

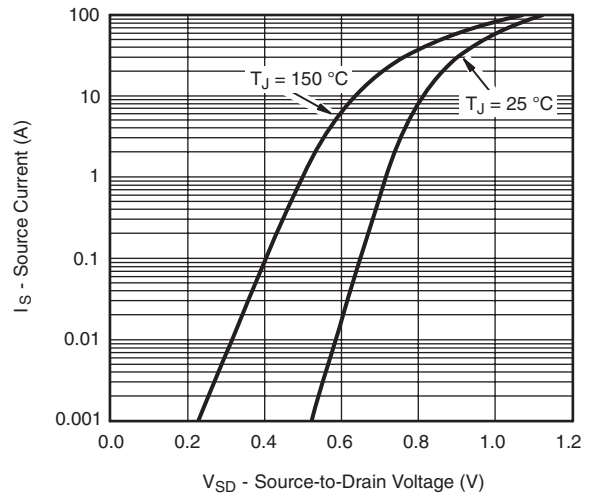
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

**Output Characteristics**

**Transfer Characteristics**

**Transconductance**

**On-Resistance vs. Drain Current**

**Capacitance**

**Gate Charge**

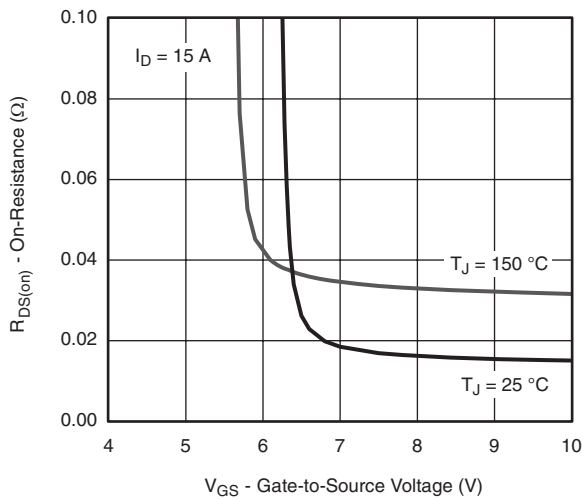
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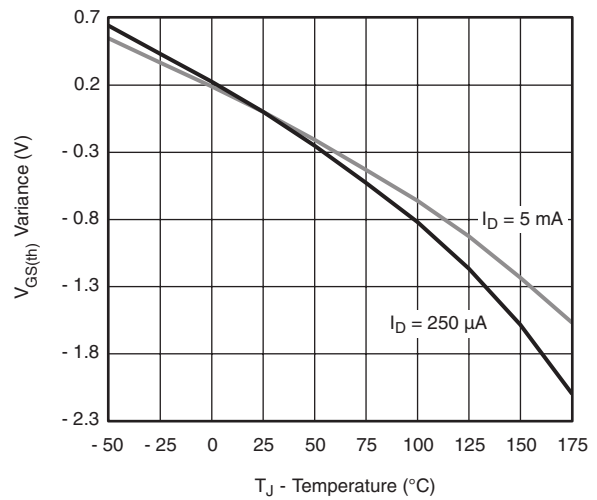
**On-Resistance vs. Junction Temperature**



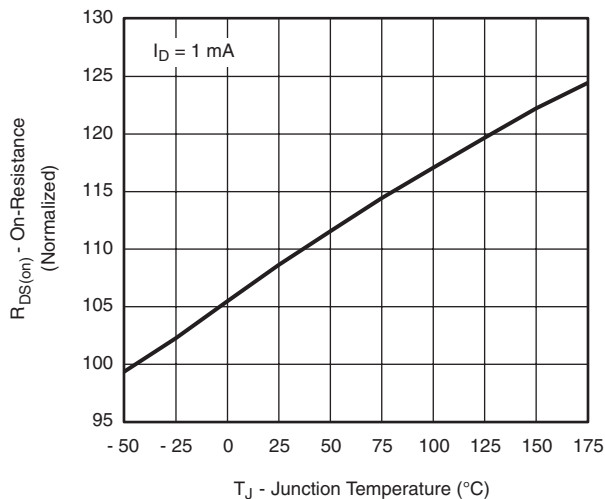
**Source-Drain Diode Forward Voltage**



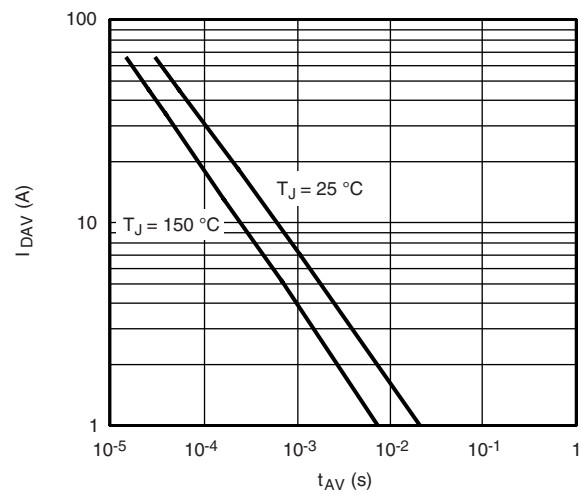
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**

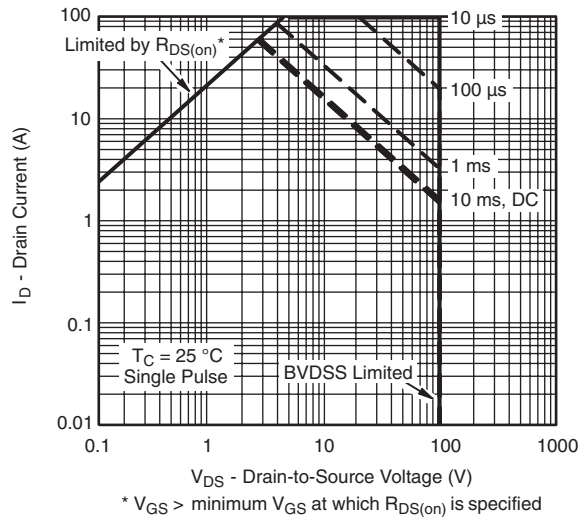


**On-Resistance vs. Junction Temperature**

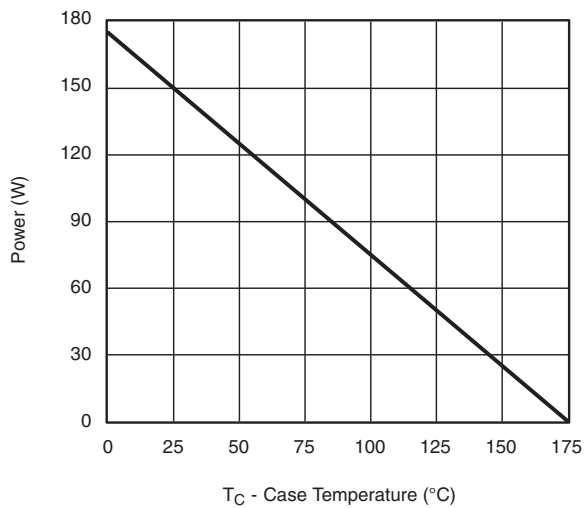


**Avalanche Current vs. Time**

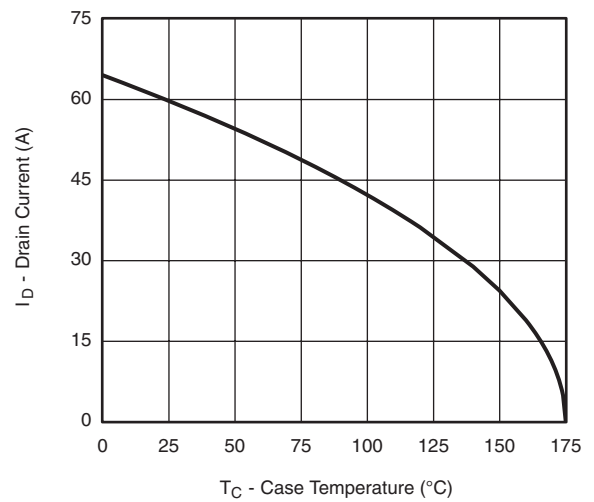
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



**Safe Operating Area**



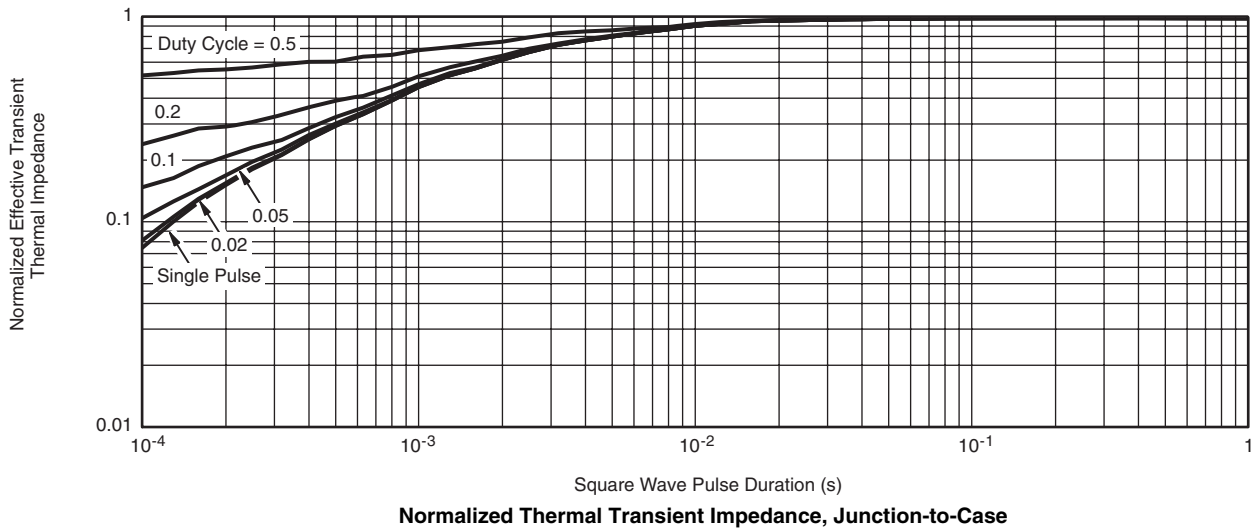
**Power Derating, Junction-to-Case**



**Current Derating\***

\* The power dissipation  $P_D$  is based on  $T_{J(max.)} = 175^\circ\text{C}$ , 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



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