

## N-Channel 75 V (D-S) MOSFET

### PRODUCT SUMMARY

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ)
75	0.0048 at V <sub>GS</sub> = 10 V	90 <sup>d</sup>	105
	0.006 at V <sub>GS</sub> = 8 V	90 <sup>d</sup>	

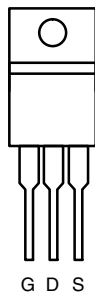
### FEATURES

- TrenchFET<sup>®</sup> Power MOSFET
- 175 °C Junction Temperature
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC

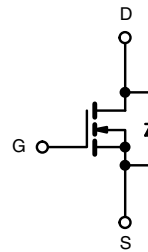

**RoHS  
COMPLIANT**

### APPLICATIONS

- Power Supply
  - Half-Bridge
  - Secondary Synchronous Rectification
- Industrial

**TO-220AB**


Top View

**Ordering Information:** SUP90N08-4m8P-E3 (Lead (Pb)-free)


N-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25 °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	75	V
Gate-Source Voltage	V <sub>GS</sub>	± 20	
Continuous Drain Current (T <sub>J</sub> = 175 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	90 <sup>d</sup>
		T <sub>C</sub> = 70 °C	90 <sup>d</sup>
Pulsed Drain Current	I <sub>DM</sub>	240	A
Avalanche Current	I <sub>AS</sub>	70	
Single Pulse Avalanche Energy <sup>a</sup>	E <sub>AS</sub>	245	mJ
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>C</sub> = 25 °C	300 <sup>b</sup>
		T <sub>A</sub> = 25 °C <sup>c</sup>	3.75
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 175	°C

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient (PCB Mount) <sup>c</sup>	R <sub>thJA</sub>	40	°C/W
Junction-to-Case (Drain)	R <sub>thJC</sub>	0.5	

Notes:

- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).
- Package limited.

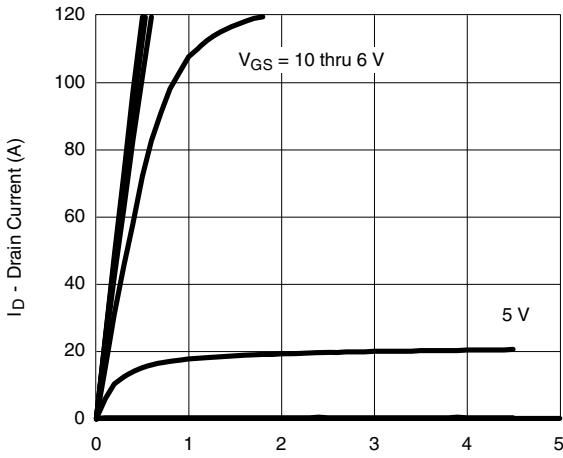
<b>SPECIFICATIONS</b> ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{DS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	75			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2		4	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 250$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 75\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 75\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 75\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$			250	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	70			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		0.004	0.0048	$\Omega$
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.0096	
		$V_{GS} = 8\text{ V}, I_D = 20\text{ A}, T_J = 150\text{ }^\circ\text{C}$			0.0106	
		$V_{GS} = 8\text{ V}, I_D = 20\text{ A}$		0.0046	0.006	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$		58		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 40\text{ V}, f = 1\text{ MHz}$		6460		pF
Output Capacitance	$C_{oss}$			571		
Reverse Transfer Capacitance	$C_{rss}$			275		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 85\text{ A}$		105	160	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			32		
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			28		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$		1.3	2.6	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 30\text{ V}, R_L = 0.4\text{ }\Omega$ $I_D \approx 85\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		23	35	ns
Rise Time <sup>c</sup>	$t_r$			17	26	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			34	52	
Fall Time <sup>c</sup>	$t_f$			8	15	
<b>Source-Drain Diode Ratings and Characteristics</b> ( $T_C = 25\text{ }^\circ\text{C}$ ) <sup>b</sup>						
Continuous Current	$I_S$				85	A
Pulsed Current	$I_{SM}$				240	
Forward Voltage <sup>a</sup>	$V_{SD}$	$I_F = 30\text{ A}, V_{GS} = 0\text{ V}$		0.85	1.5	V
Reverse Recovery Time	$t_{rr}$	$I_F = 75\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		68	100	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			2.6	4	A
Reverse Recovery Charge	$Q_{rr}$				88	132

**Notes:**

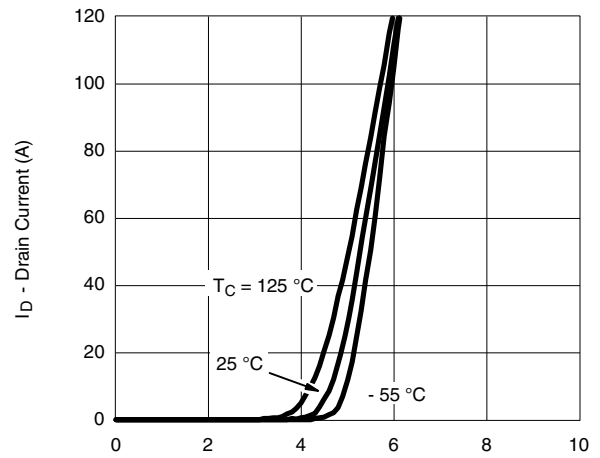
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

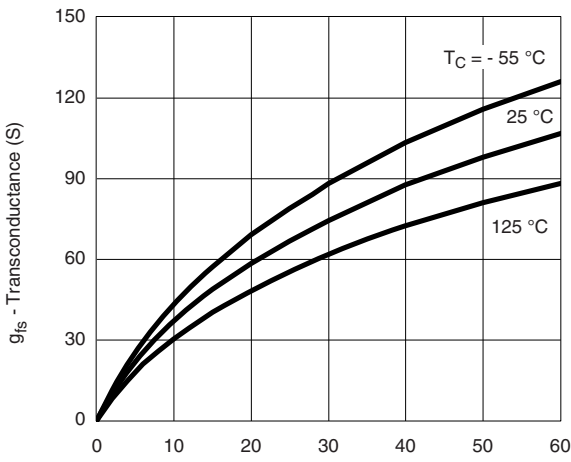
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



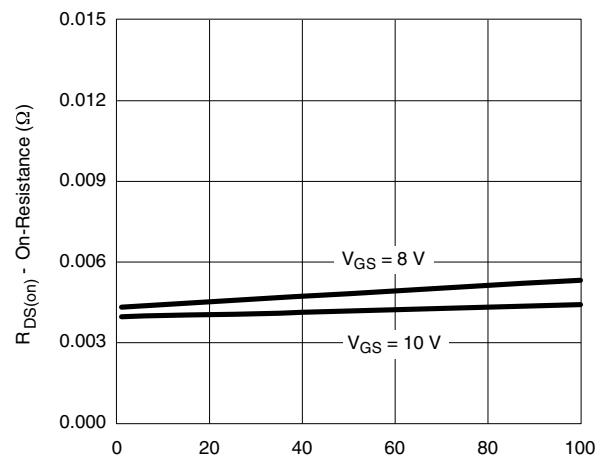
**Output Characteristics**



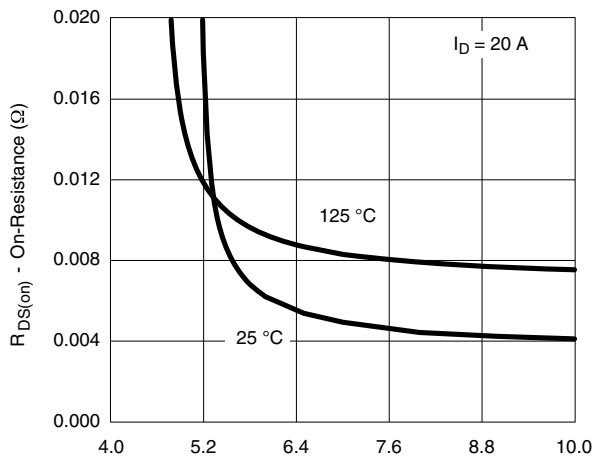
**Transfer Characteristics**



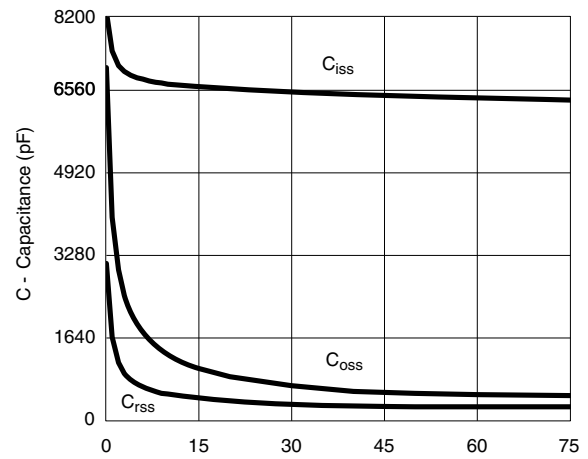
**Transconductance**



**On-Resistance vs. Drain Current**

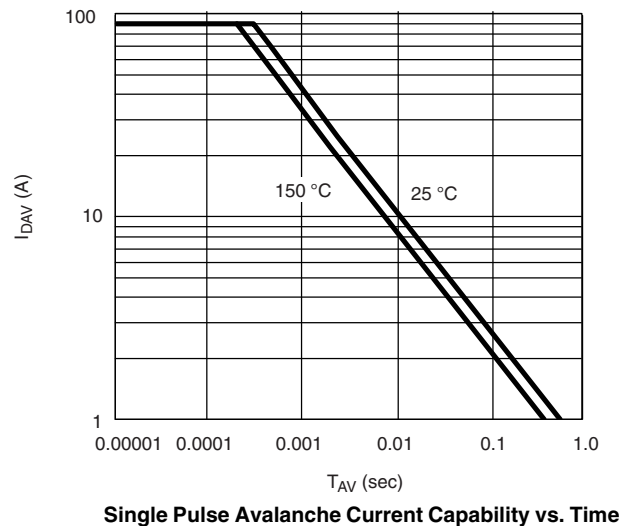
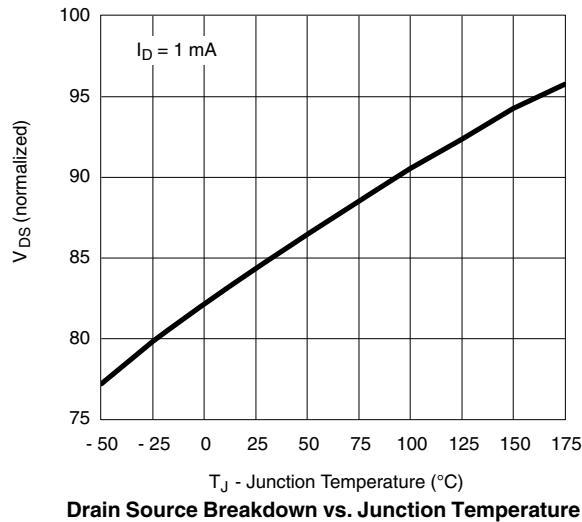
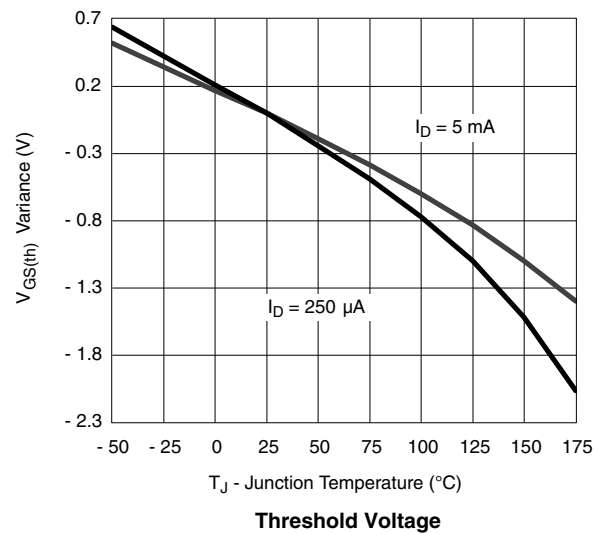
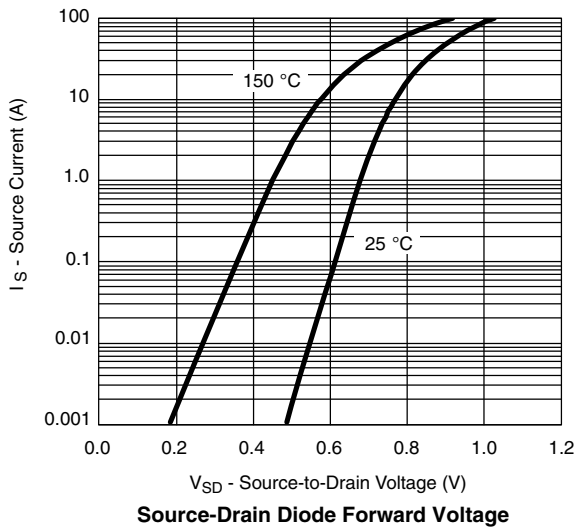
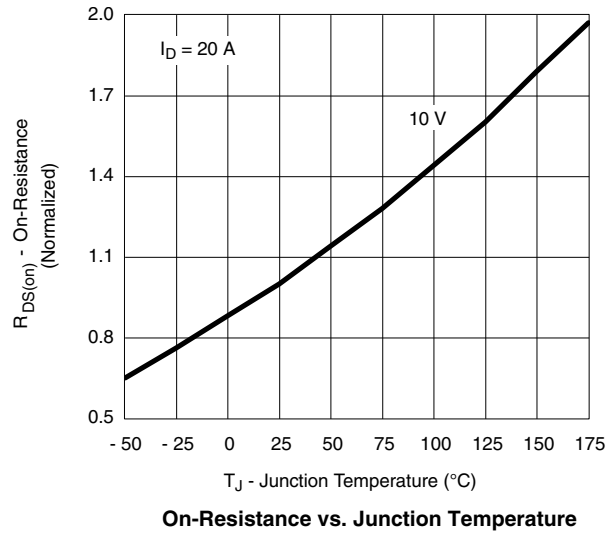
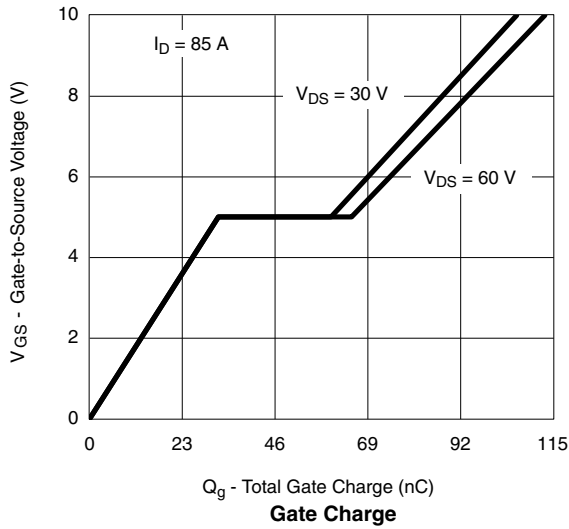


**On-resistance vs. Gate-to-Source Voltage**

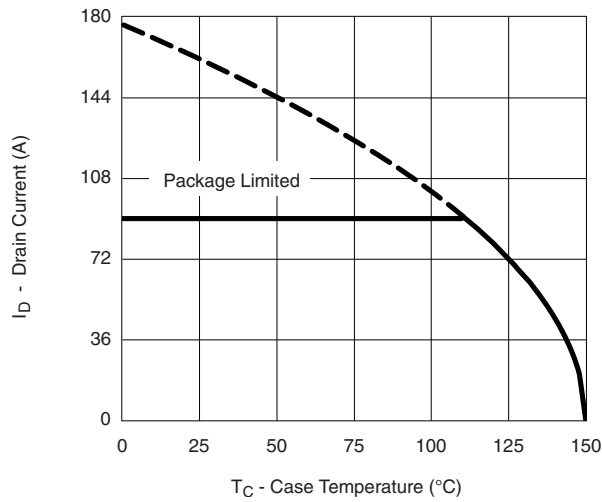


**Capacitance**

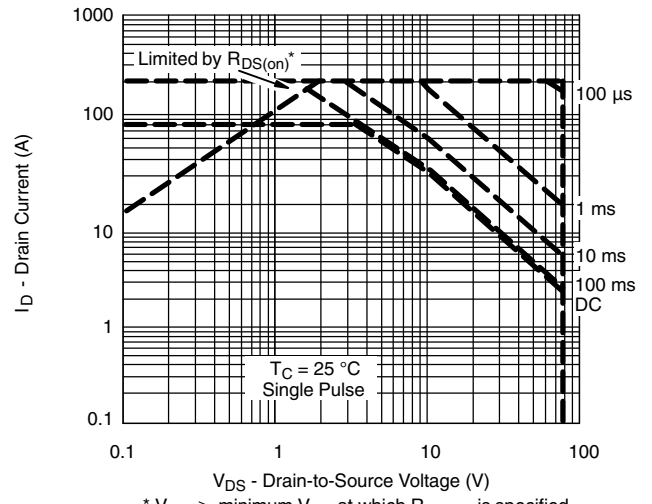
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



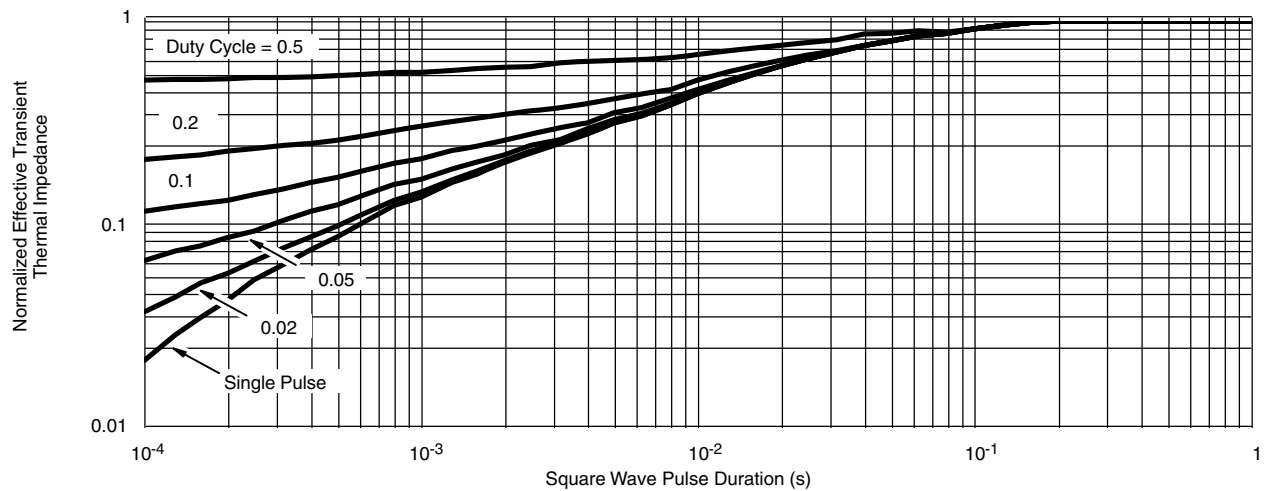
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



**Maximum Drain Current vs. Case Temperature**



**Safe Operating Area**  
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified



**Normalized Thermal Transient Impedance, Junction-to-Case**

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