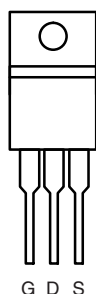


# N-Channel 100 V (D-S) MOSFET

## PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)	$Q_g$ (Typ.)
100	0.0088 at $V_{GS} = 10$ V	90 <sup>d</sup>	97

TO-220AB



Top View

Ordering Information: SUP90N10-8m8P-E3 (Lead (Pb)-free)

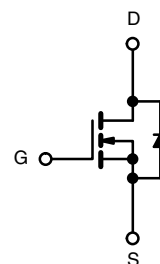
## FEATURES

- TrenchFET® Power MOSFET
- 175 °C Junction Temperature
- 100 %  $R_g$  and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



## APPLICATIONS

- Power Supply
  - Secondary Synchronous Rectification
- Industrial
- Primary Switch



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	90 <sup>d</sup>
		$T_C = 70$ °C	90 <sup>d</sup>
Pulsed Drain Current	$I_{DM}$	240	A
Avalanche Current	$I_{AS}$	60	
Single Avalanche Energy <sup>a</sup>	$E_{AS}$	180	mJ
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_C = 25$ °C	300 <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)	$R_{thJC}$	0.5	

Notes:

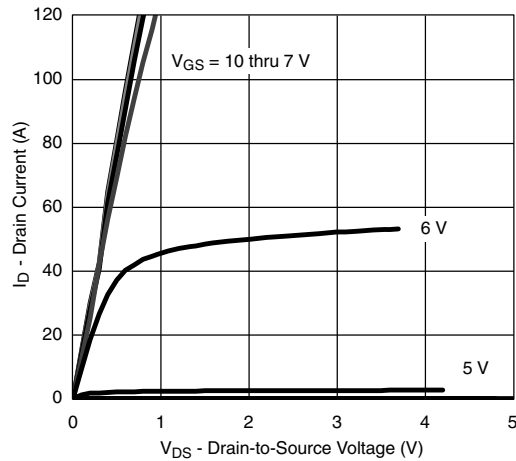
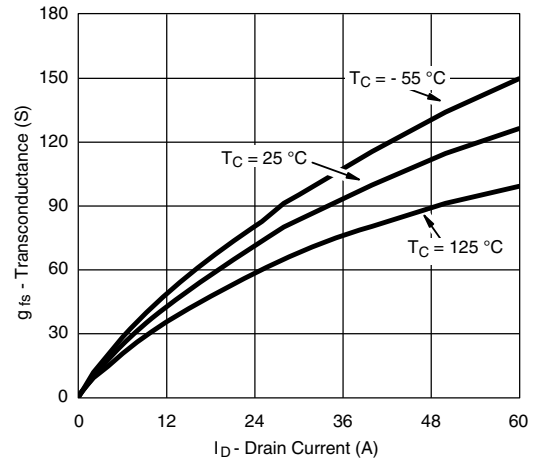
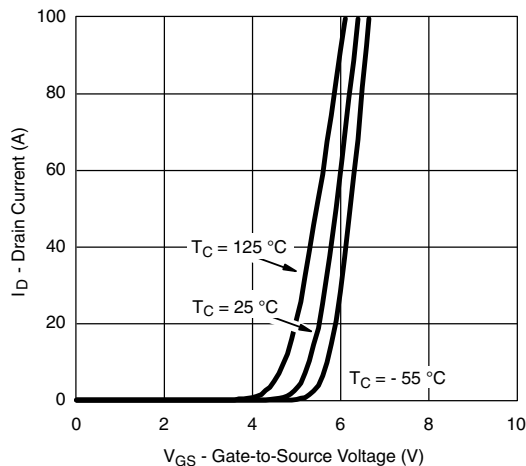
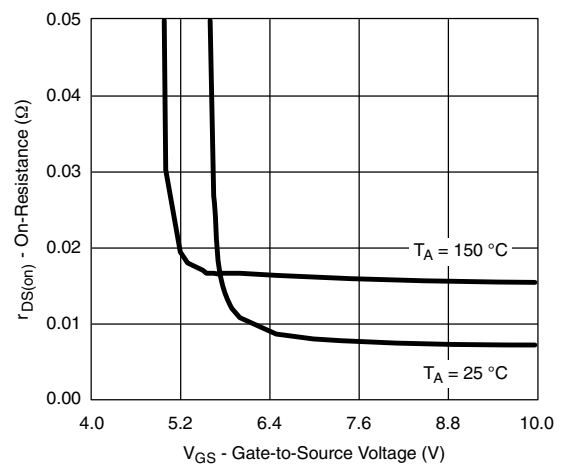
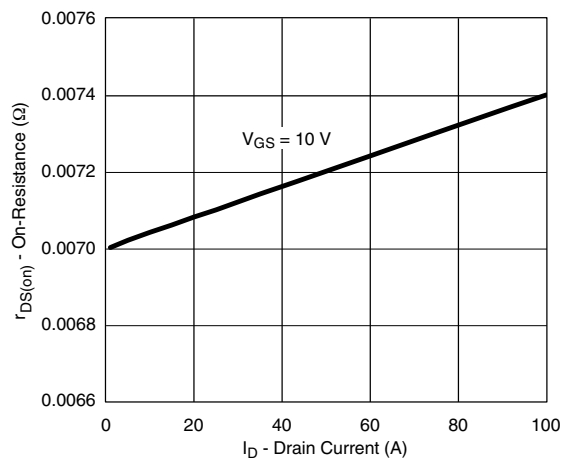
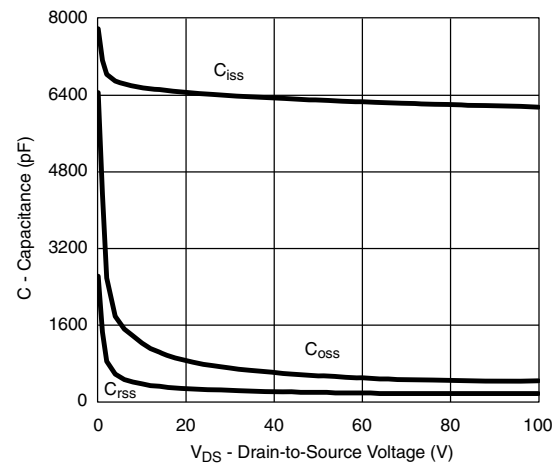
- Duty cycle  $\leq 1$  %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).
- Package limited.

SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>DS</sub> = 0, I <sub>D</sub> = 250 μA	100			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2.5		4.5	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V			± 250	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50	
		V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 150 °C			250	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 10 V, V <sub>GS</sub> = 10 V	70			A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A		0.00725	0.0088	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 125 °C		0.0137	0.0184	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A		62		S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 50 V, f = 1 MHz		6290		pF
Output Capacitance	C <sub>oss</sub>			535		
Reverse Transfer Capacitance	C <sub>rss</sub>			182		
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 85 A		97	150	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			32		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			25		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		1.4	2.8	Ω
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 50 V, R <sub>L</sub> = 0.588 Ω I <sub>D</sub> ≅ 85 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω		23	35	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			17	26	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			34	52	
Fall Time <sup>c</sup>	t <sub>f</sub>			9	18	
Source-Drain Diode Ratings and Characteristics T <sub>C</sub> = 25 °C <sup>b</sup>						
Continuous Current	I <sub>S</sub>				85	A
Pulsed Current	I <sub>SM</sub>				240	
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 30 A, V <sub>GS</sub> = 0 V		0.85	1.5	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 75 A, dI/dt = 100 A/μs		61	100	ns
Peak Reverse Recovery Current	I <sub>RM(REC)</sub>			3.0	4.5	A
Reverse Recovery Charge	Q <sub>rr</sub>				91	130

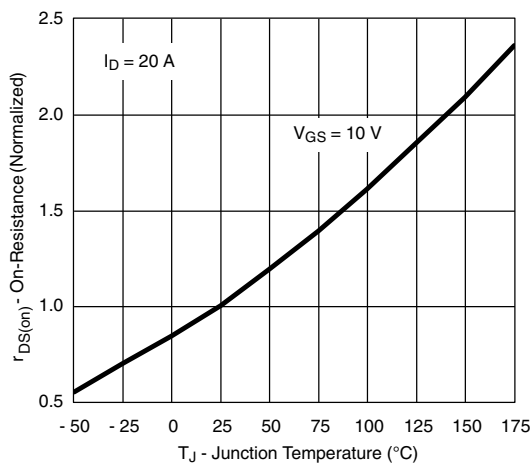
## Notes:

- 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.

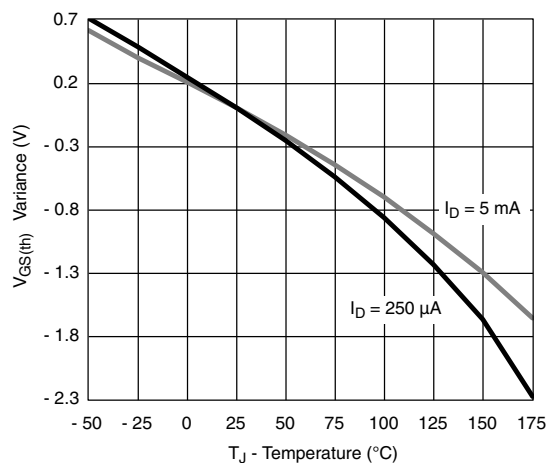
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)**Output Characteristics****Transconductance****Transfer Characteristics****On-resistance vs. Gate-to-Source Voltage****On-Resistance vs. Drain Current****Capacitance**

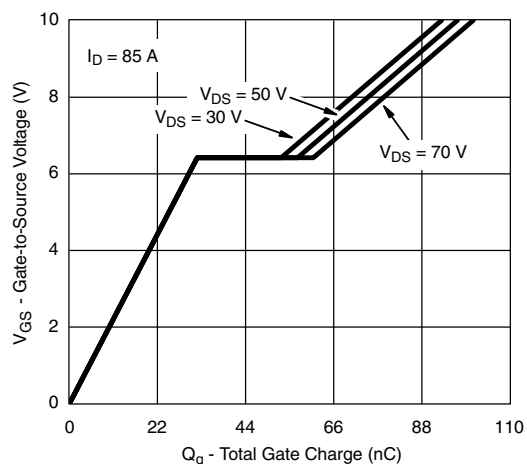
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



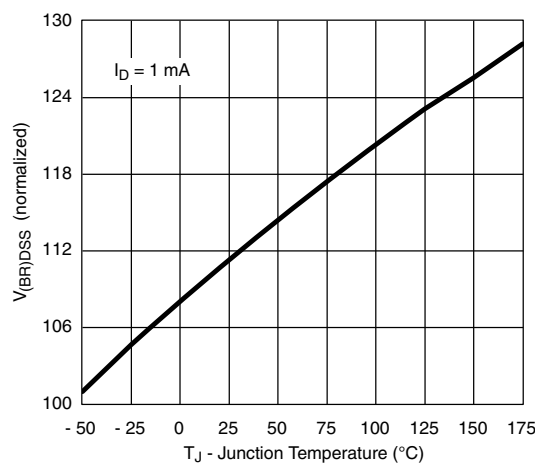
On-Resistance vs. Junction Temperature



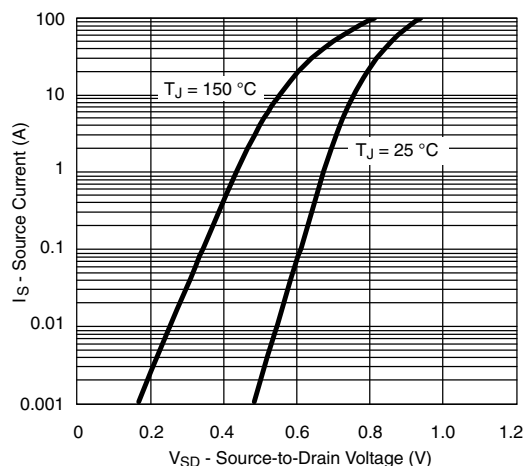
Threshold Voltage



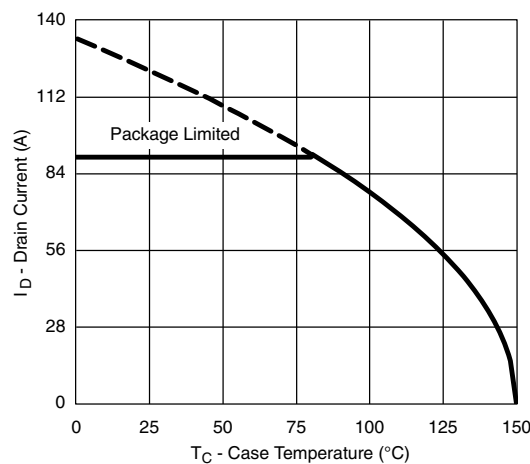
Gate Charge



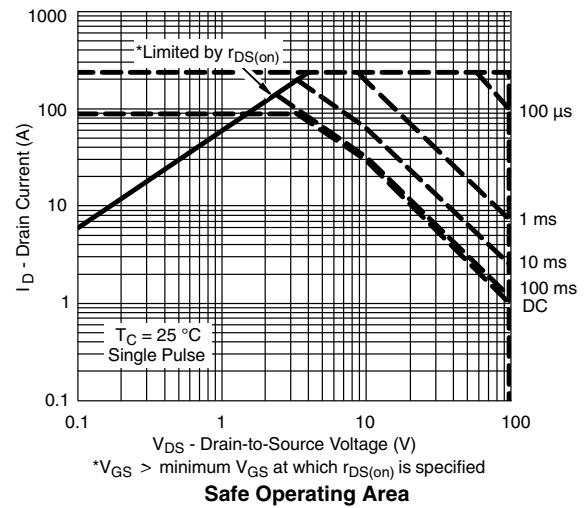
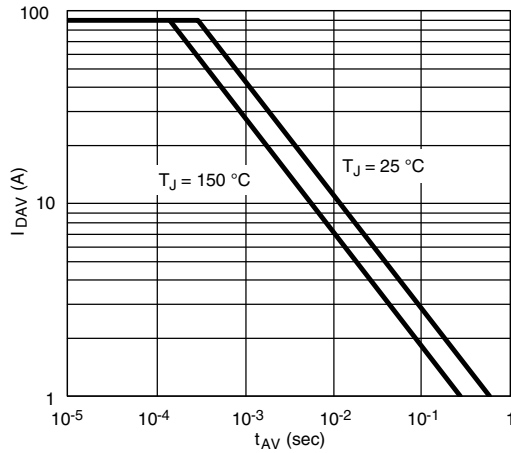
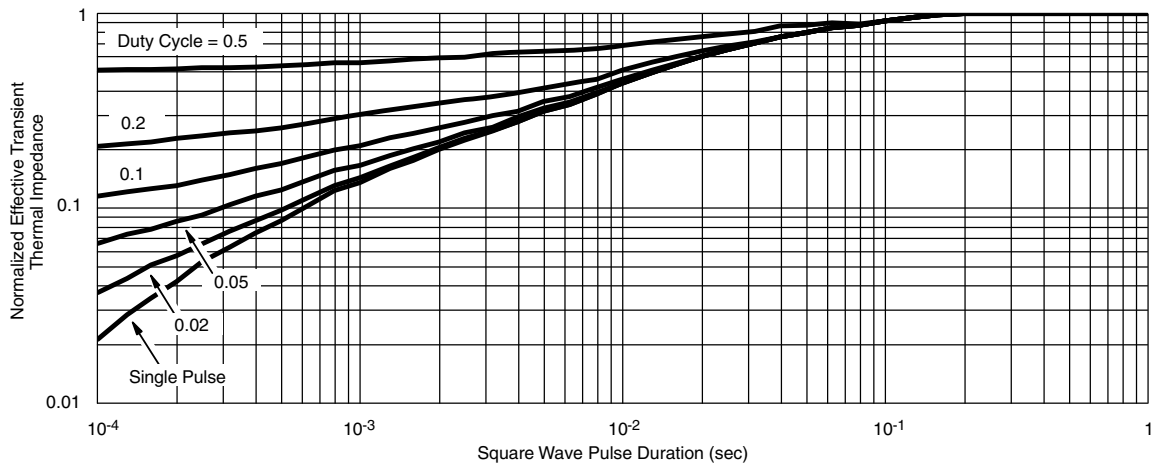
Drain Source Breakdown vs. Junction Temperature



Source-Drain Diode Forward Voltage



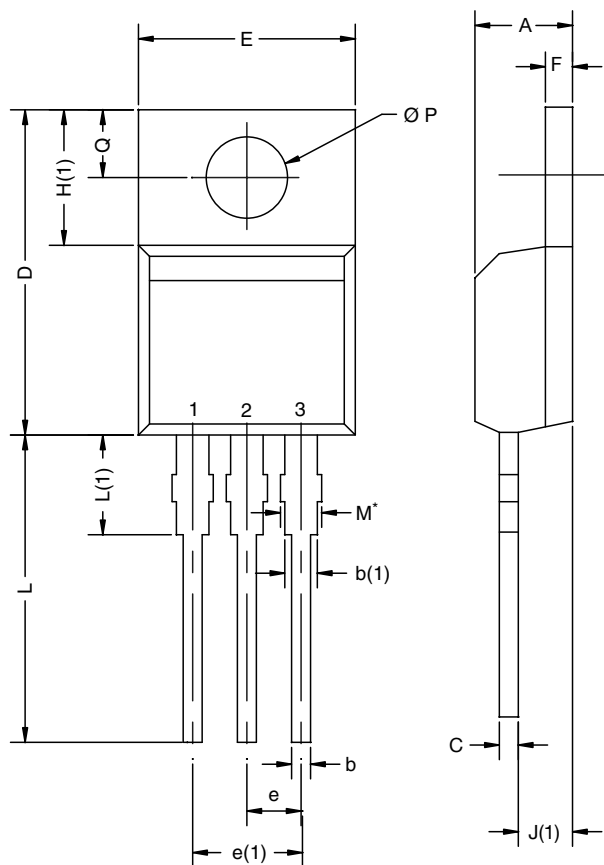
Maximum Drain Current vs. Case Temperature

**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)**Single Pulse Avalanche Current Capability vs. Time****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
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: T13-0724-Rev. O, 14-Oct-13  
DWG: 5471

### Note

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



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