



N-Channel 60-V (D-S) 175°C MOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
60	0.0049 @ $V_{GS} = 10$ V	90 ^a
	0.0055 @ $V_{GS} = 4.5$ V	

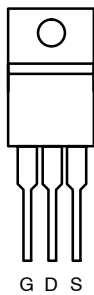
FEATURES

- TrenchFET® Power MOSFET
- 175°C Maximum Junction Temperature

APPLICATIONS

- Automotive Such As
 - High-Side Switch
 - Motor Drives
 - 12-V Battery
- Synchronous Rectification

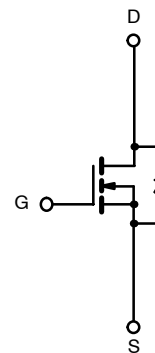
TO-220AB



Top View

DRAIN connected to TAB

Ordering Information: SUP90N06-05L—E3



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V_{DS}	60	V	
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ($T_J = 175^\circ\text{C}$)	I_D	$T_C = 25^\circ\text{C}$	90 ^a	A
		$T_C = 125^\circ\text{C}$	90 ^a	
Pulsed Drain Current	I_{DM}	240		
Avalanche Current, Single Pulse	I_{AS}	75		
Repetitive Avalanche Energy, Single Pulse	E_{AS}	$L = 0.1$ mH	280	mJ
Maximum Power Dissipation			P_D	300 ^b
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$	

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Limit	Unit
Junction-to-Ambient (Free Air)	R_{thJA}	62.5	$^\circ\text{C/W}$
Junction-to-Case	R_{thJC}	0.5	

Notes

- Package limited.
- See SOA curve for voltage derating.

SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{DS} = 0 V, I _D = 250 μA	60			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1		3	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V			1	μA
		V _{DS} = 60 V, V _{GS} = 0 V, T _J = 125 °C			50	
		V _{DS} = 60 V, V _{GS} = 0 V, T _J = 175 °C			250	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	120			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 30 A		0.0039	0.0049	Ω
		V _{GS} = 4.5 V, I _D = 20 A		0.0044	0.0055	
		V _{GS} = 10 V, I _D = 30 A, T _J = 125 °C			0.0083	
		V _{GS} = 10 V, I _D = 30 A, T _J = 175 °C			0.0103	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 30 A	30			S
Dynamic^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		12900		pF
Output Capacitance	C _{oss}			1060		
Reverse Transfer Capacitance	C _{rss}			700		
Gate Resistance	R _g	f = 1.0 MHz		1.3		Ω
Total Gate Charge ^c	Q _g	V _{DS} = 30 V, V _{GS} = 10 V, I _D = 90 A		200	300	nC
Gate-Source Charge ^c	Q _{gs}			50		
Gate-Drain Charge ^c	Q _{gd}			33		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 0.33 Ω I _D ≅ 90 A, V _{GEN} = 10 V, R _g = 2.5 Ω		22	35	ns
Rise Time ^c	t _r			130	200	
Turn-Off Delay Time ^c	t _{d(off)}			110	165	
Fall Time ^c	t _f			280	420	
Source-Drain Diode Ratings and Characteristics (T_C = 25 °C)^b						
Continuous Current	I _S				90	A
Pulsed Current	I _{SM}				240	
Forward Voltage ^a	V _{SD}	I _F = 90 A, V _{GS} = 0 V		1.1	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 90 A, di/dt = 100 A/μs		55	82	ns
Peak Reverse Recovery Current	I _{RM(REC)}			3.6	5.4	A
Reverse Recovery Charge	Q _{rr}			0.1	0.22	μC

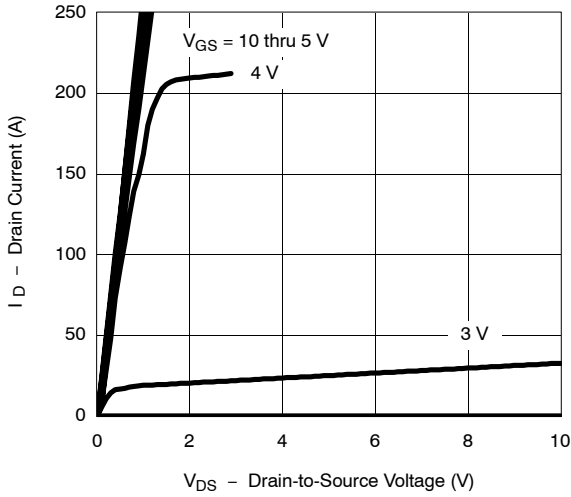
Notes

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

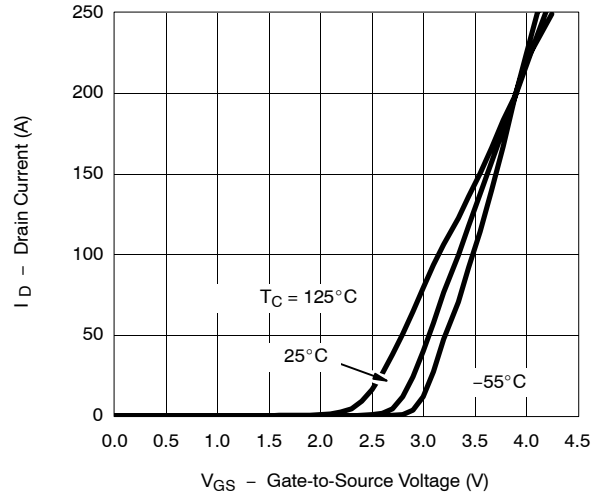


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

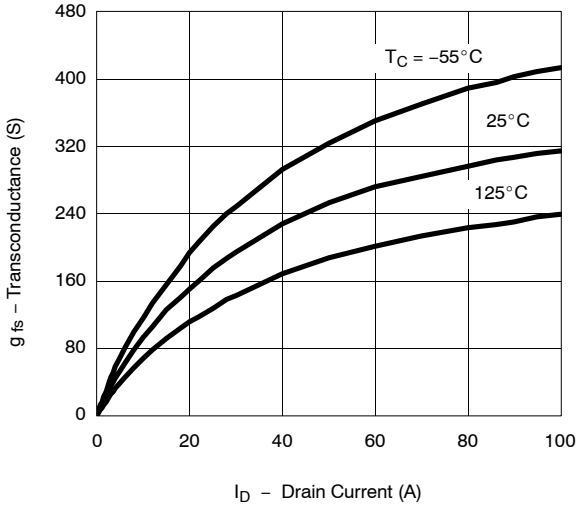
Output Characteristics



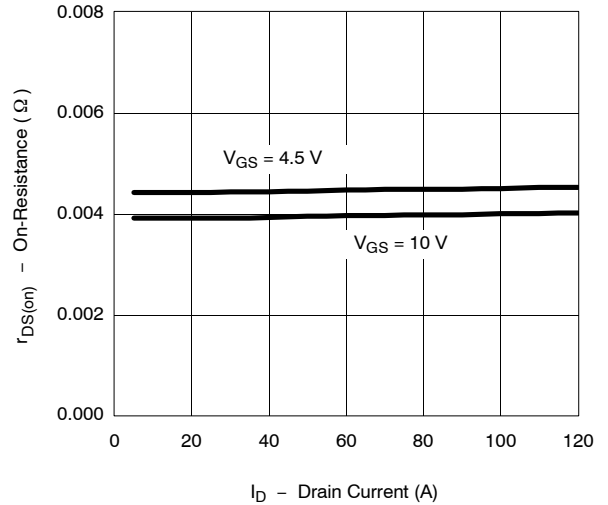
Transfer Characteristics



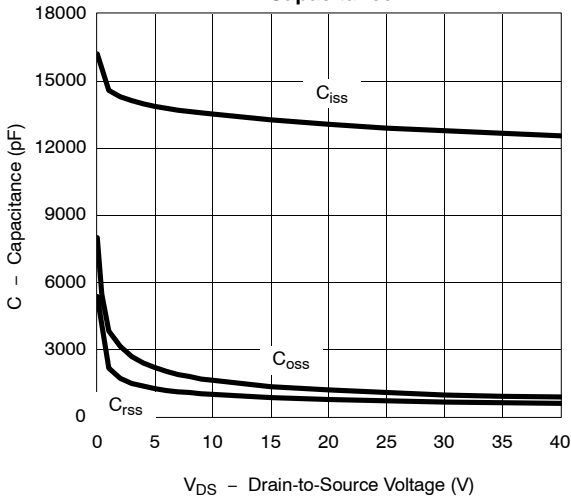
Transconductance



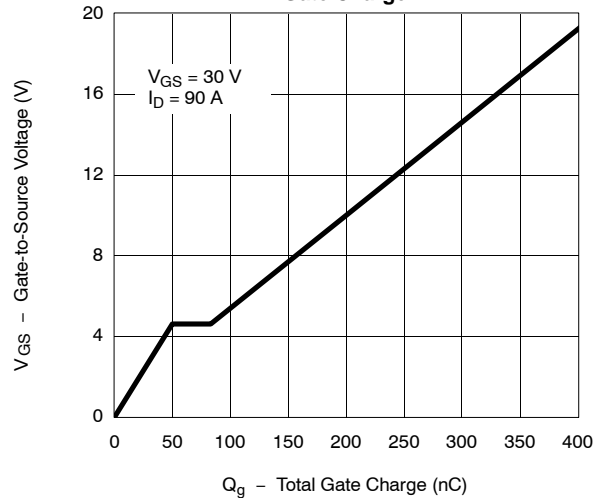
On-Resistance vs. Drain Current



Capacitance

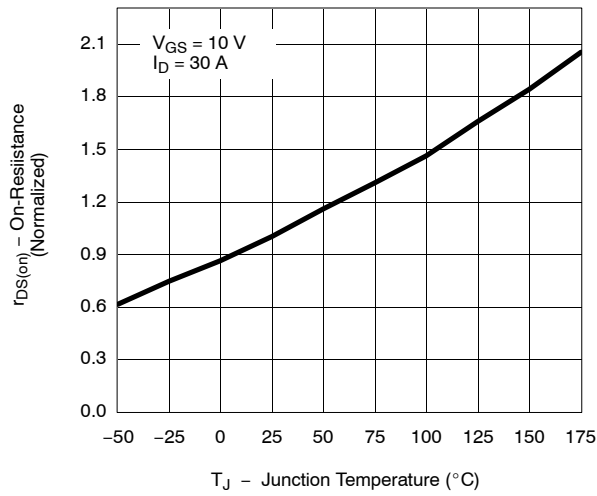


Gate Charge

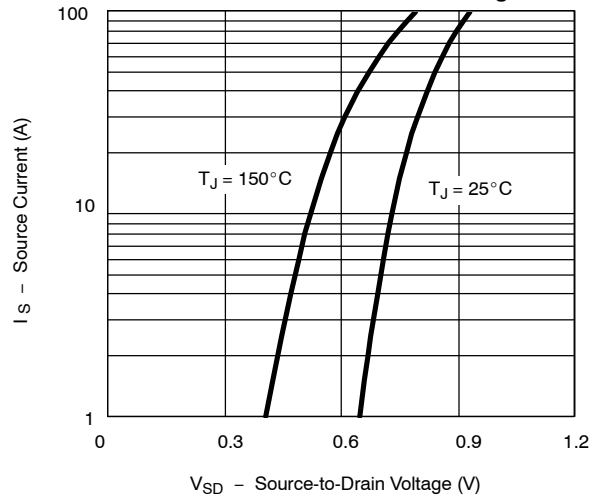


TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

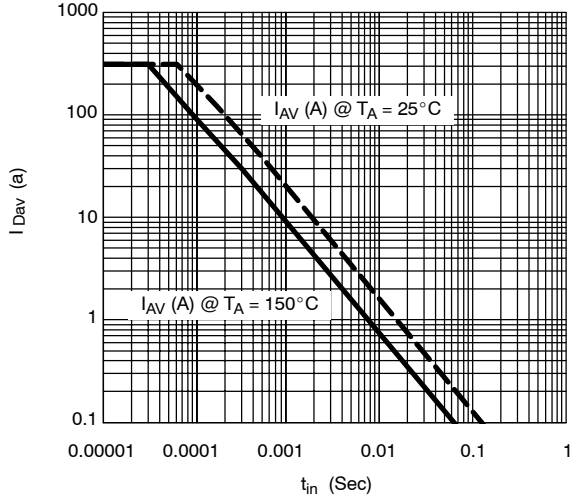
On-Resistance vs. Junction Temperature



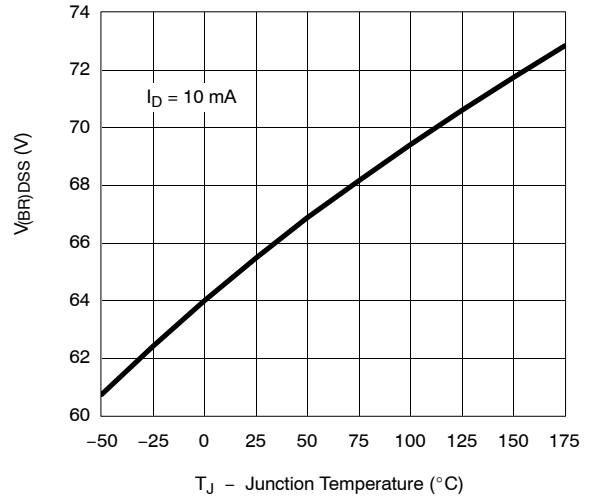
Source-Drain Diode Forward Voltage



Avalanche Current vs. Time



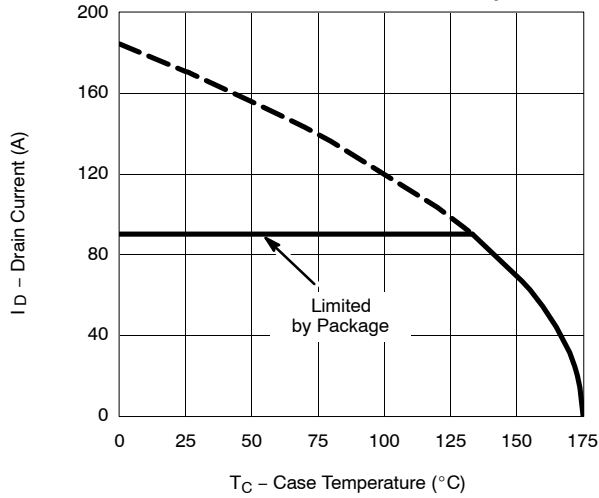
Drain Source Breakdown vs. Junction Temperature



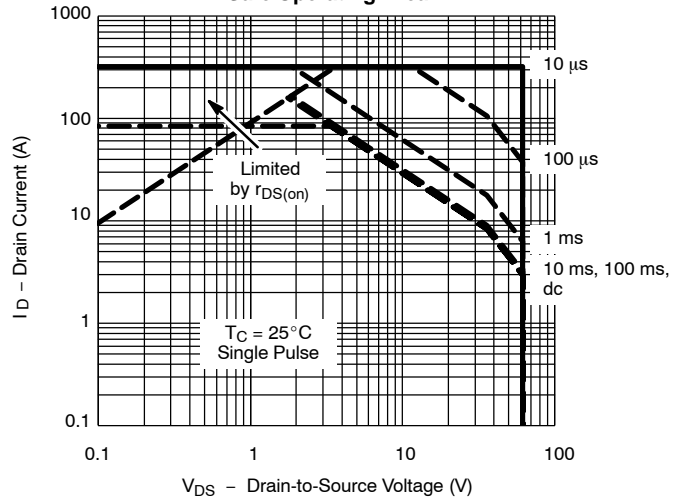


THERMAL RATINGS

Maximum Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

