P-Channel 60-V (D-S) 175°C MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)[c]
−60	0.0093 @ V_{GS} = −10 V	−90
	0.0118 @ V_{GS} = −4.5 V	−90

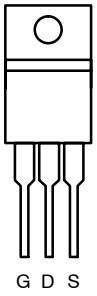
FEATURES

- TrenchFET® Power MOSFET

APPLICATIONS

- DC/DC Primary Switch
- Automotive
  - 12-V Boardnet
  - High-Side Switches
  - Motor Drives

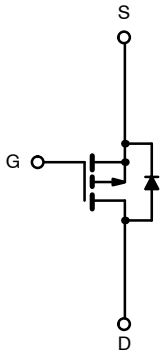
TO-220AB



DRAIN connected to TAB

Top View

Ordering Information: SUP90P06-09L—E3



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	−60	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current[c] (T_J = 175°C)	T_C = 25°C	I_D	−90	A
	T_C = 125°C		−67	
Pulsed Drain Current		I_{DM}	−200	
Avalanche Current	L = 0.1 mH	I_{AS}	−65	
Single Pulse Avalanche Energy[a]		E_{AS}	211	mJ
Power Dissipation	T_C = 25°C	P_D	250[b]	W
	T_A = 25°C		2.4	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to 175	°C

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Limit	Unit
Junction-to-Ambient Free Air	R_{thJA}	62	°C/W
Junction-to-Case	R_{thJC}	0.6	

Notes:
a. Duty cycle ≤ 1%.
b. See SOA curve for voltage derating.
c. Limited by package.

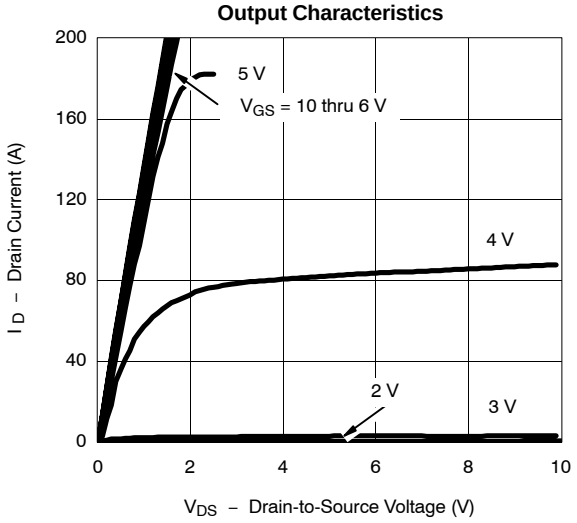
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 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		0.0074	0.0093	Ω
		V_{GS} = −10 V, I_D = −30 A, T_J = 125°C			0.0150	
		V_{GS} = −10 V, I_D = −30 A, T_J = 175°C			0.0190	
		V_{GS} = −4.5 V, I_D = −20 A		0.0094	0.0118	
Forward Transconductance[a]	g_{fs}	V_{DS} = −15 V, I_D = −30 A	20			S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = −25 V, f = 1 MHz		9200		pF
Output Capacitance	C_{oss}			975		
Reversen Transfer Capacitance	C_{rss}			760		
Total Gate Charge[c]	Q_g	V_{DS} = −30 V, V_{GS} = −10 V, I_D = −90 A		160	240	nC
Gate-Source Charge[c]	Q_{gs}			40		
Gate-Drain Charge[c]	Q_{gd}			36		
Gate Resistance	R_g	f = 1.0 MHz		3		Ω
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		20	30	ns
Rise Time[c]	t_r			190	285	
Turn-Off Delay Time[c]	$t_{d(off)}$			140	210	
Fall Time[c]	t_f			300	450	
Source-Drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Continuous Current	I_s				−90	A
Pulsed Current	I_{SM}				−200	
Forward Voltage[a]	V_{SD}	I_F = −50 A, V_{GS} = 0 V		−1.0	−1.5	V
Reverse Recovery Time	t_{rr}	I_F = −50 A, di/dt = 100 A/μs		60	90	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			−3	−4.5	A
Reverse Recovery Charge	Q_{rr}			0.09	0.2	μC

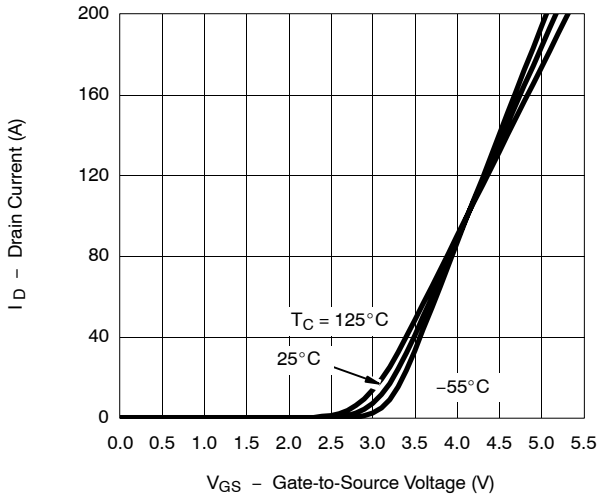
Notes:
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

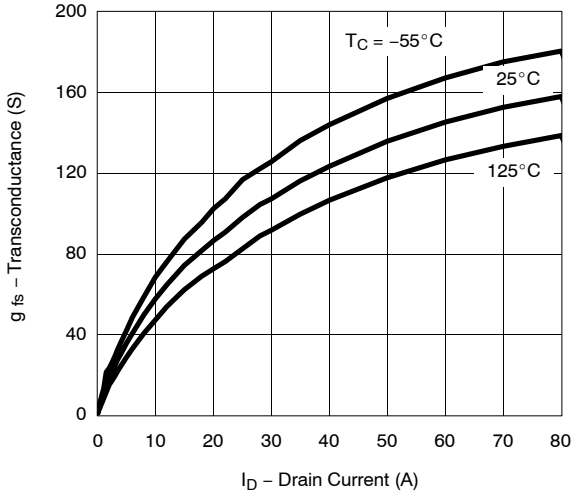
Output Characteristics



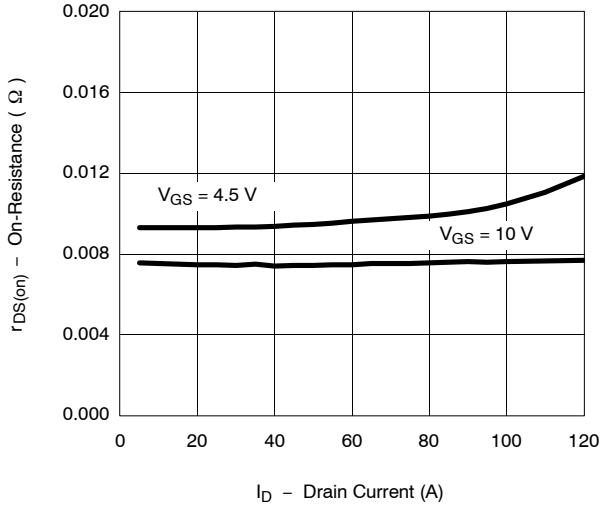
Transfer Characteristics



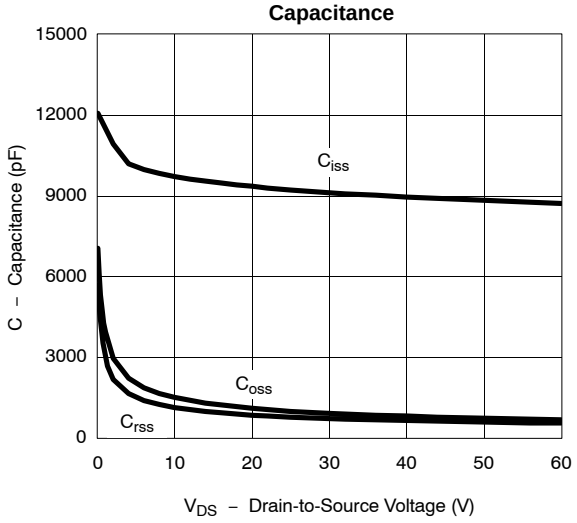
Transconductance



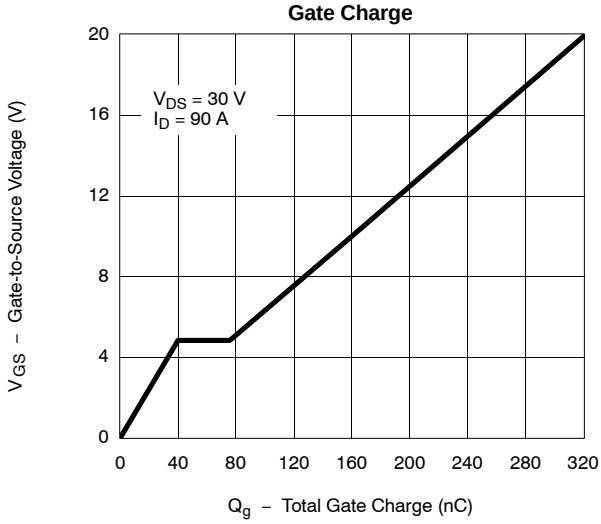
On-Resistance vs. Drain Current



Capacitance

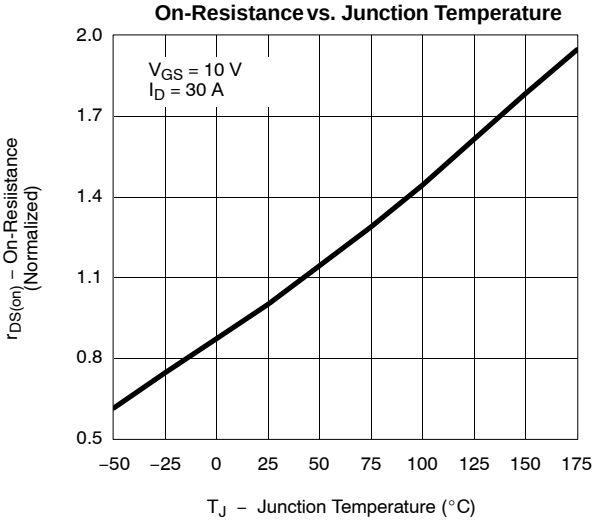


Gate Charge

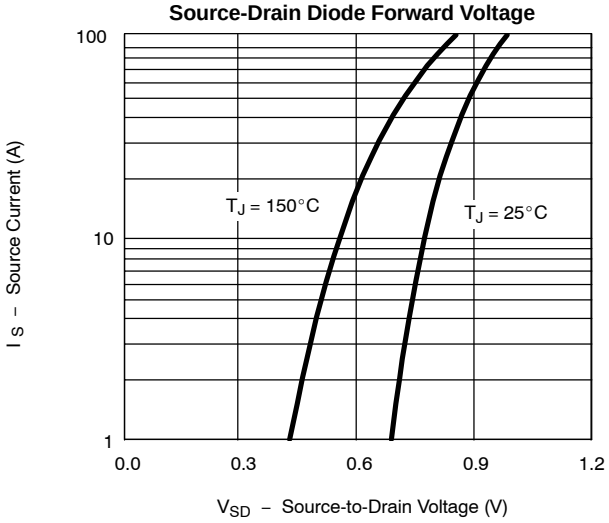


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

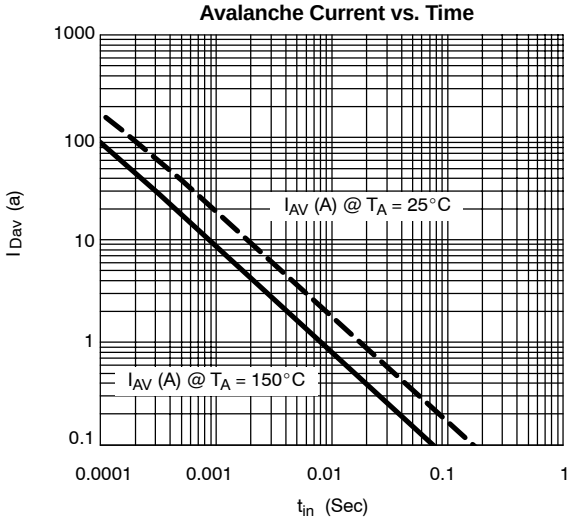
On-Resistance vs. Junction Temperature



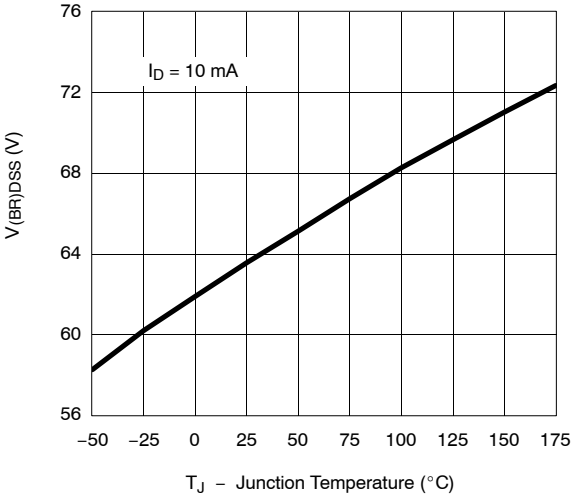
Source-Drain Diode Forward Voltage



Avalanche Current vs. Time

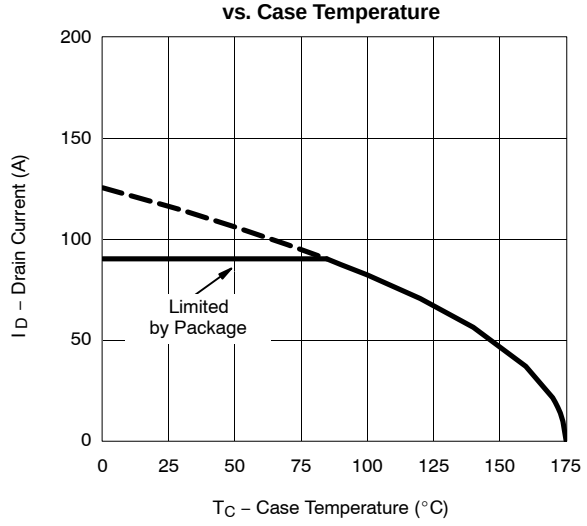


Drain Source Breakdown vs. Junction Temperature

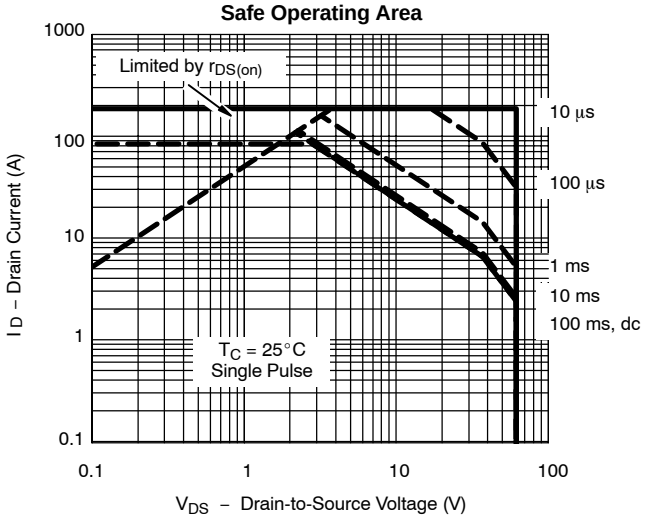


THERMAL RATINGS

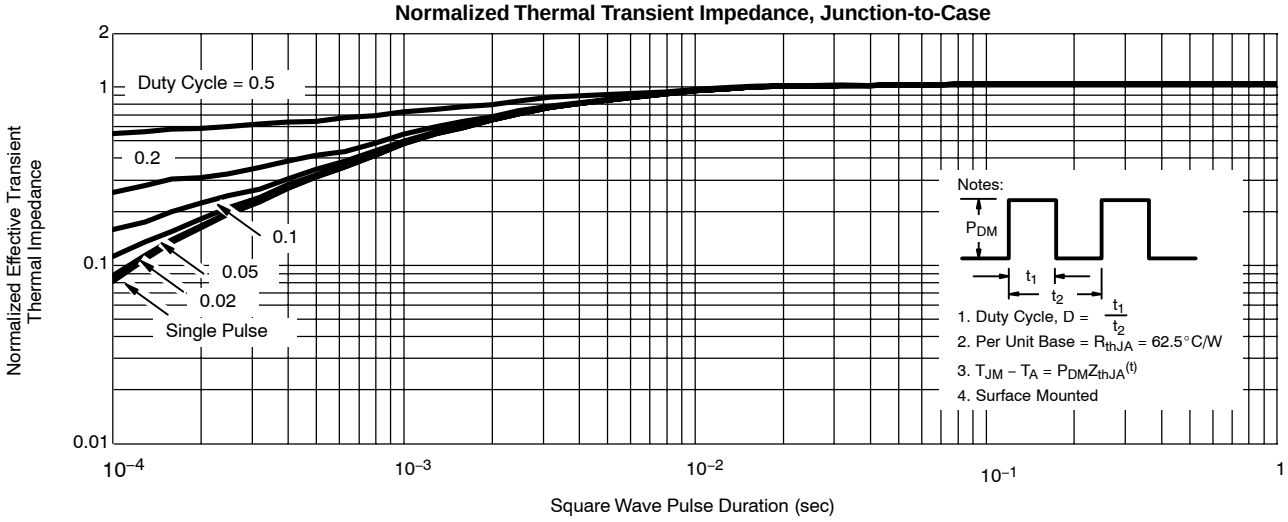
Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case



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