

## P-Channel 60-V (D-S) 175°C MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>c</sup>
-60	0.0093 @ $V_{GS} = -10$ V	-90
	0.0118 @ $V_{GS} = -4.5$ V	-90

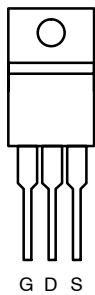
### FEATURES

- TrenchFET® Power MOSFET

### APPLICATIONS

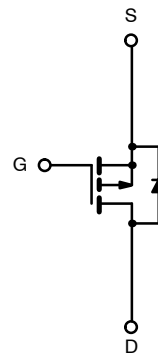
- DC/DC Primary Switch
- Automotive
  - 12-V Boardnet
  - High-Side Switches
  - Motor Drives

TO-220AB



Top View

DRAIN connected to TAB



P-Channel MOSFET

Ordering Information: SUP90P06-09L—E3

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	$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>c</sup> ( $T_J = 175^\circ\text{C}$ )	$I_D$	$T_C = 25^\circ\text{C}$	-90
		$T_C = 125^\circ\text{C}$	-67
Pulsed Drain Current	$I_{DM}$	-200	A
Avalanche Current	$I_{AS}$	-65	mJ
Single Pulse Avalanche Energy <sup>a</sup>	$E_{AS}$	211	
Power Dissipation	$P_D$	$T_C = 25^\circ\text{C}$	250 <sup>b</sup>
		$T_A = 25^\circ\text{C}$	2.4
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	$^\circ\text{C}/\text{W}$
Junction-to-Case	$R_{thJC}$	0.6	

Notes:

- Duty cycle  $\leq 1\%$ .
- See SOA curve for voltage derating.
- Limited by package.

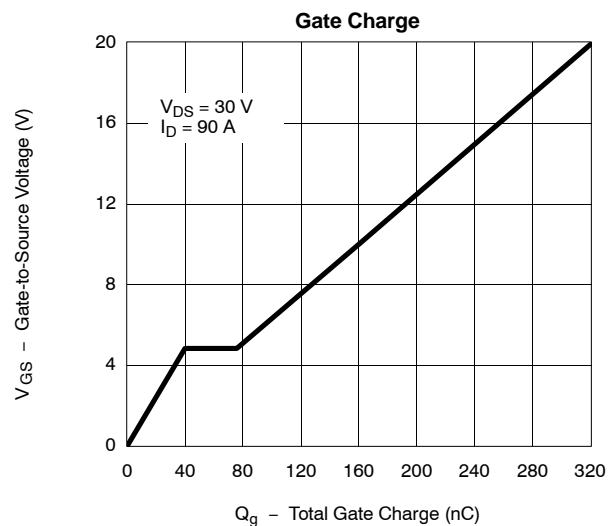
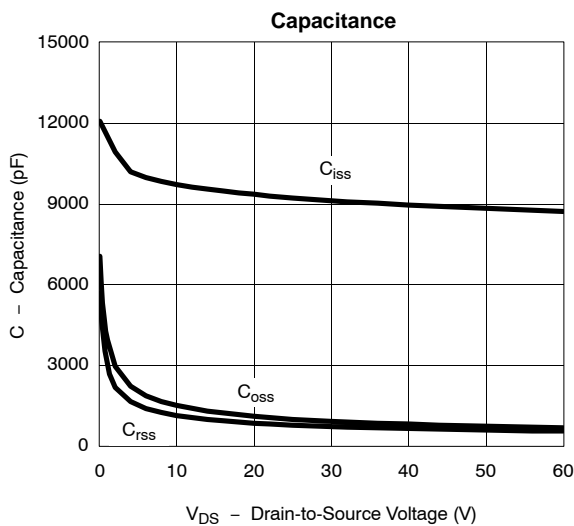
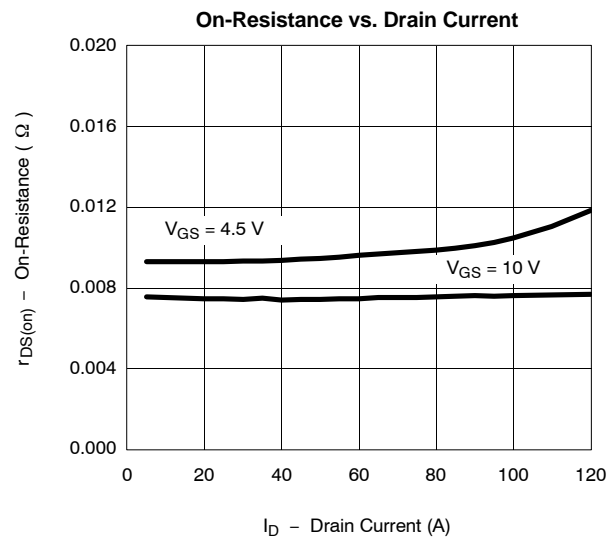
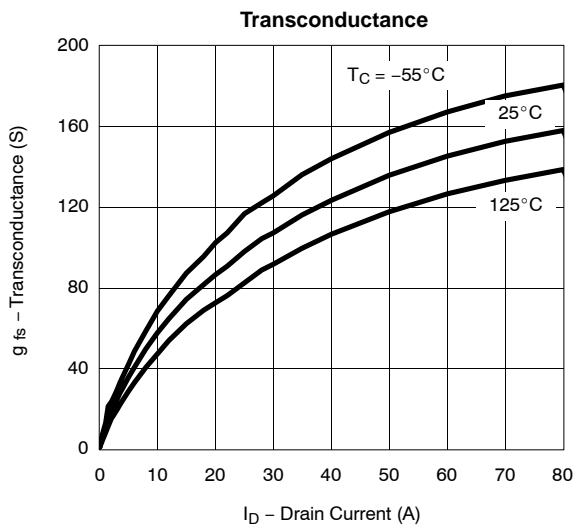
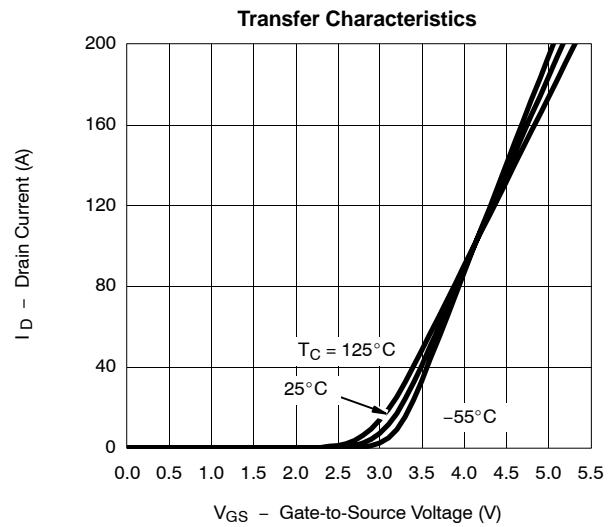
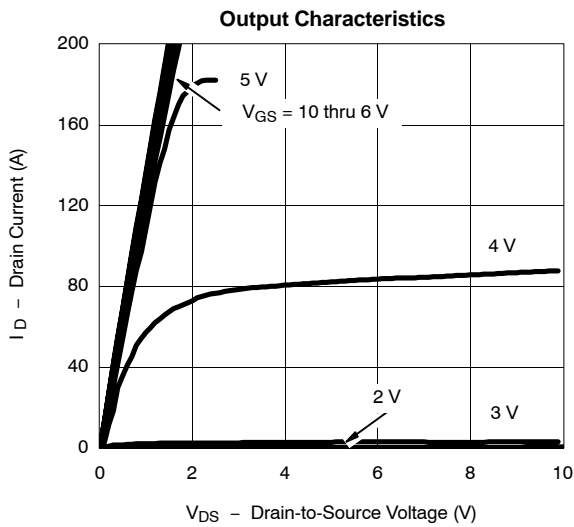
SPECIFICATIONS (T <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)							
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit	
<b>Static</b>							
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 μA	-60			V	
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA	-1		-3		
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±100	nA	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -60 V, V <sub>GS</sub> = 0 V			-1	μA	
		V <sub>DS</sub> = -60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			-50		
		V <sub>DS</sub> = -60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C			-250		
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = -5 V, V <sub>GS</sub> = -10 V	-120			A	
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -30 A		0.0074	0.0093	Ω	
		V <sub>GS</sub> = -10 V, I <sub>D</sub> = -30 A, T <sub>J</sub> = 125 °C			0.0150		
		V <sub>GS</sub> = -10 V, I <sub>D</sub> = -30 A, T <sub>J</sub> = 175 °C			0.0190		
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -20 A		0.0094	0.0118		
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -15 V, I <sub>D</sub> = -30 A	20			S	
<b>Dynamic<sup>b</sup></b>							
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = -25 V, f = 1 MHz		9200		pF	
Output Capacitance	C <sub>oss</sub>			975			
Reversen Transfer Capacitance	C <sub>rss</sub>			760			
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = -30 V, V <sub>GS</sub> = -10 V, I <sub>D</sub> = -90 A		160	240	nC	
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			40			
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			36			
Gate Resistance	R <sub>g</sub>	f = 1.0 MHz		3		Ω	
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = -30 V, R <sub>L</sub> = 0.33 Ω I <sub>D</sub> ≈ -90 A, V <sub>GEN</sub> = -10 V, R <sub>g</sub> = 2.5 Ω		20	30	ns	
Rise Time <sup>c</sup>	t <sub>r</sub>			190	285		
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			140	210		
Fall Time <sup>c</sup>	t <sub>f</sub>			300	450		
<b>Source-Drain Diode Ratings and Characteristics (T<sub>C</sub> = 25 °C)<sup>b</sup></b>							
Continuous Current	I <sub>s</sub>				-90	A	
Pulsed Current	I <sub>SM</sub>				-200		
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = -50 A, V <sub>GS</sub> = 0 V		-1.0	-1.5	V	
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = -50 A, di/dt = 100 A/μs		60	90	ns	
Peak Reverse Recovery Current	I <sub>RM(REC)</sub>				-3	-4.5	A
Reverse Recovery Charge	Q <sub>rr</sub>				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.

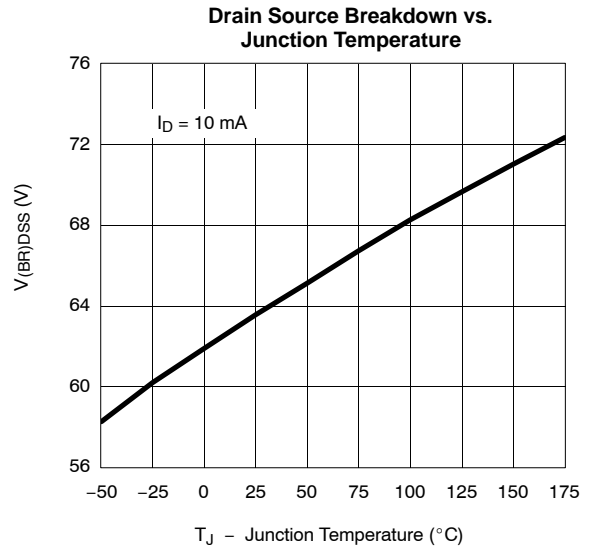
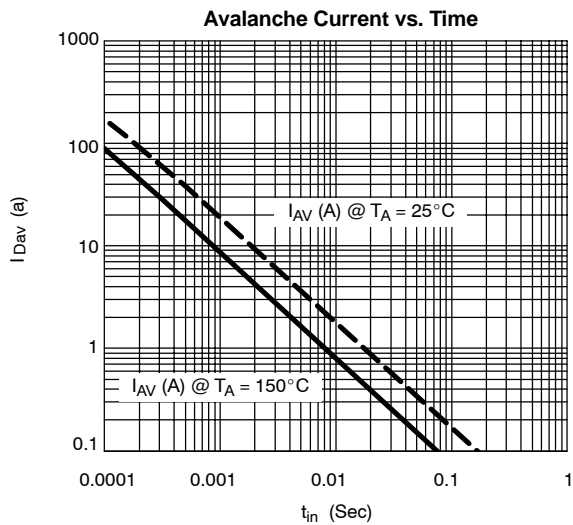
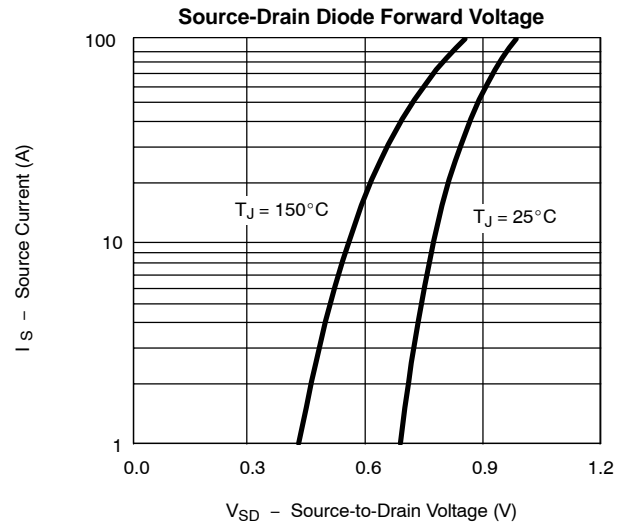
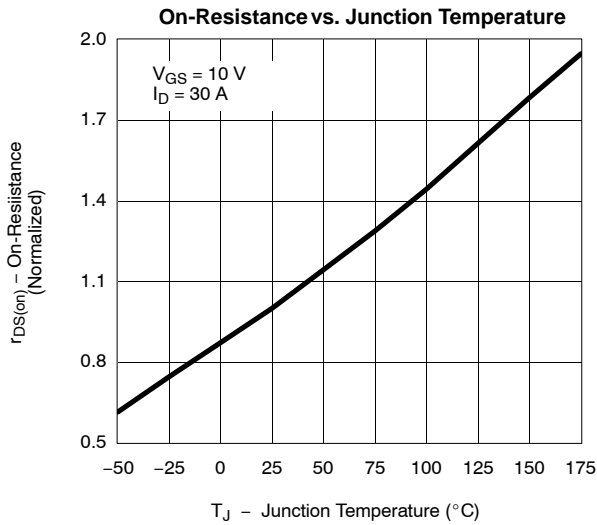


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**





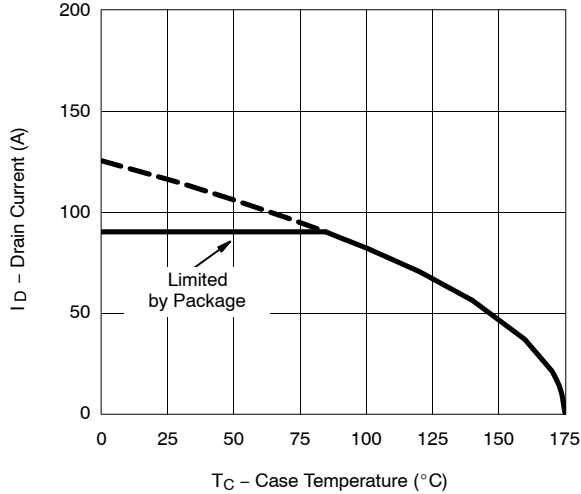
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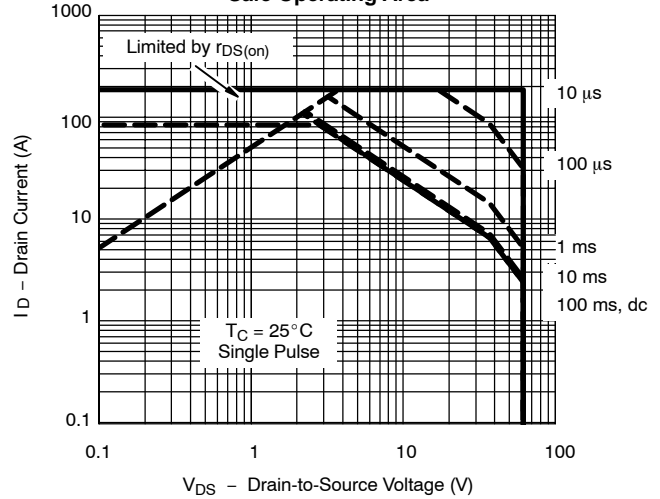


**THERMAL RATINGS**

Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

