



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

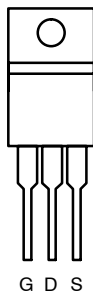
FEATURES

- TrenchFET® Power MOSFET

APPLICATIONS

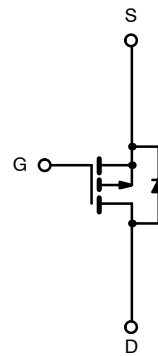
- DC/DC Primary Switch
- Automotive
 - 12-V Boardnet
 - High-Side Switches
 - Motor Drives

TO-220AB



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

Notes:

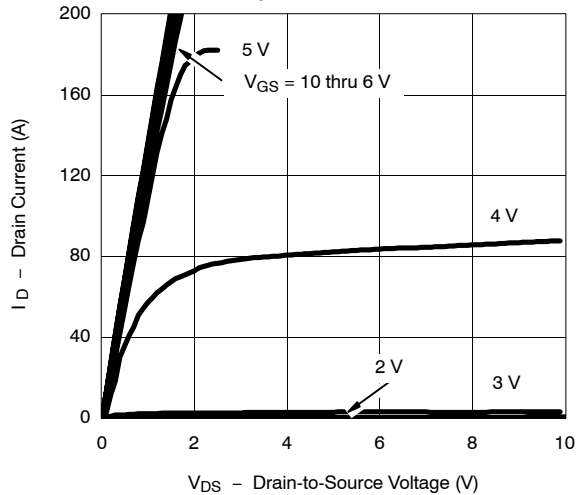
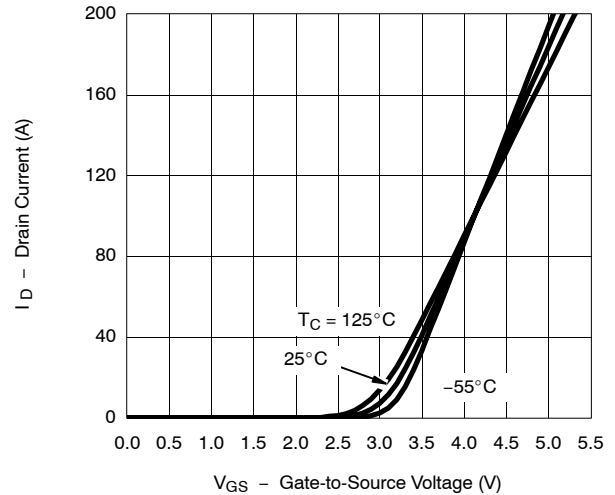
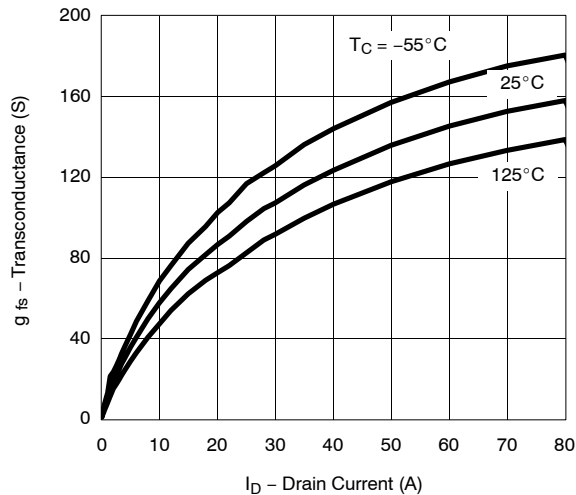
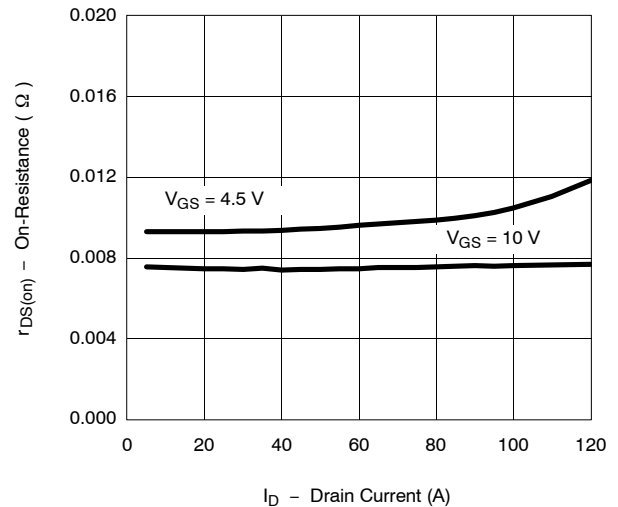
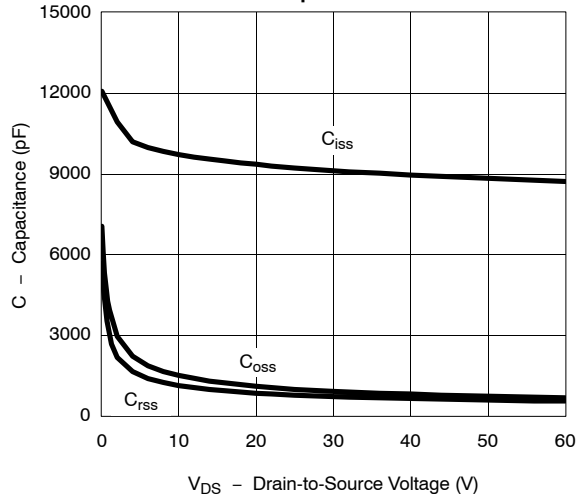
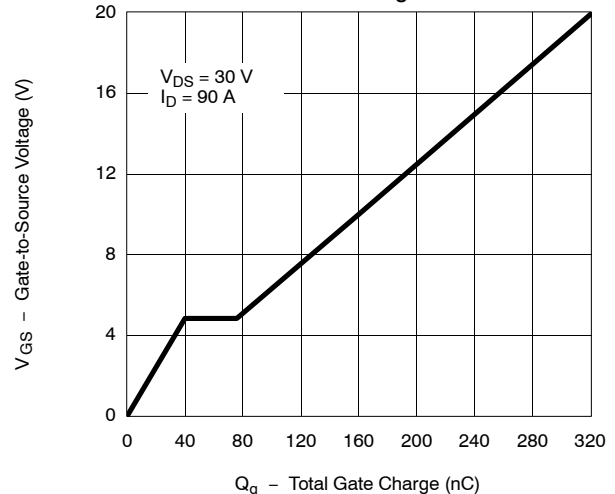
- Duty cycle $\leq 1\%$.
- See SOA curve for voltage derating.
- Limited by package.

SPECIFICATIONS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

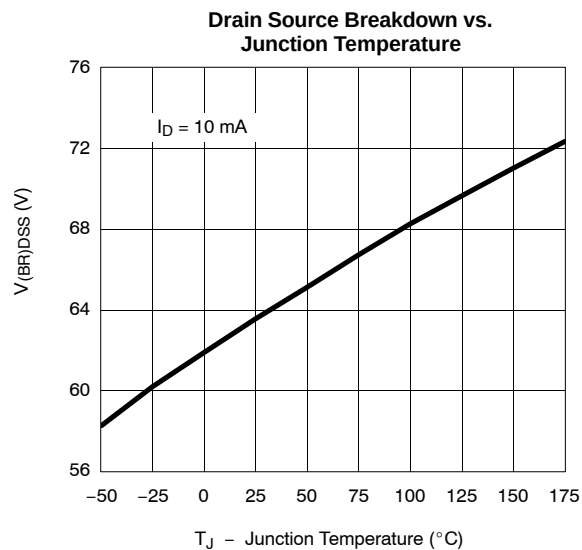
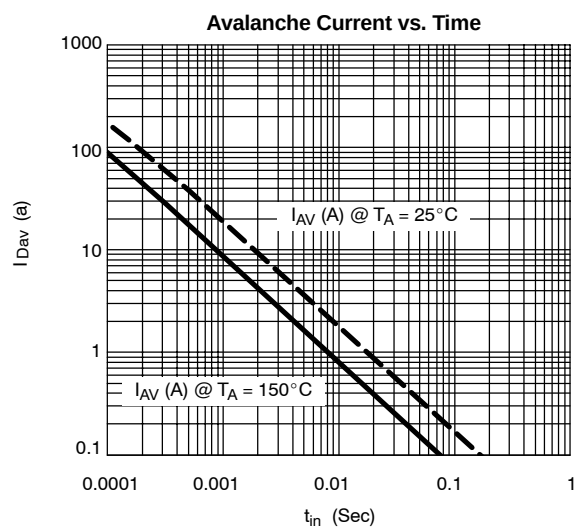
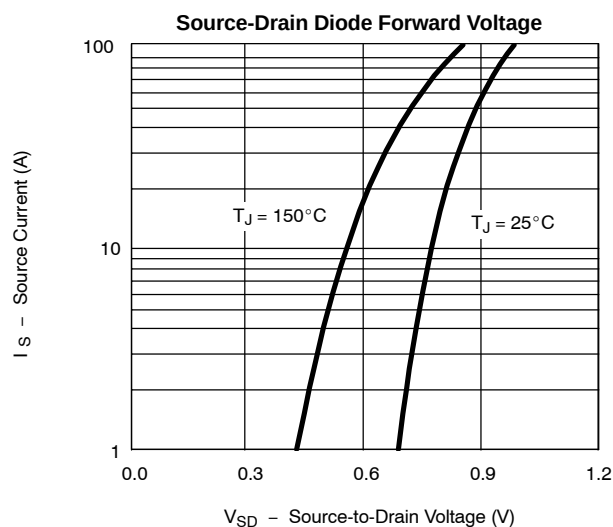
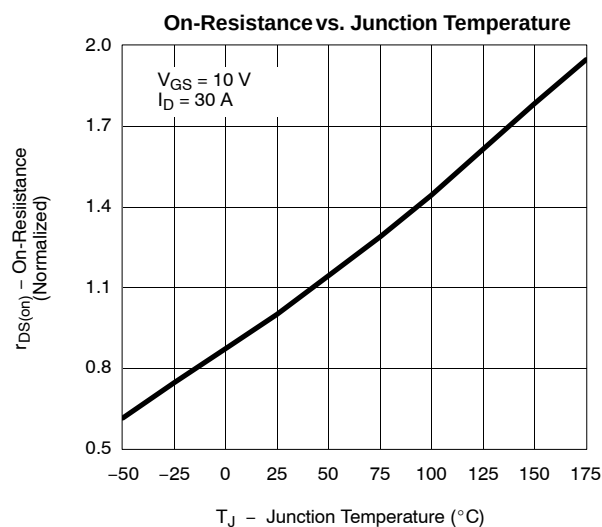
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = -250 μA	-60			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250 μA	-1		-3	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA
Zero Gate Voltage 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 $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
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**

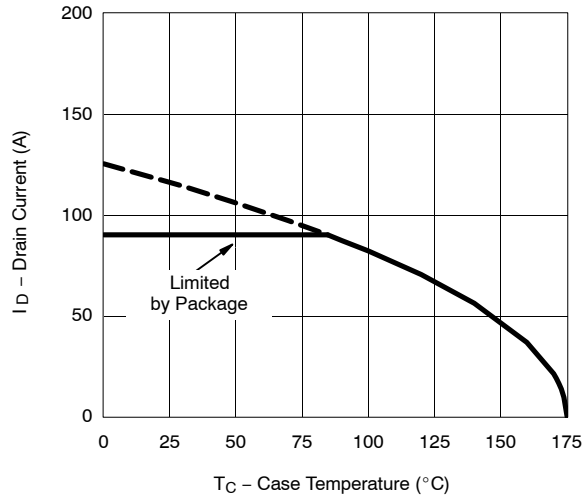
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



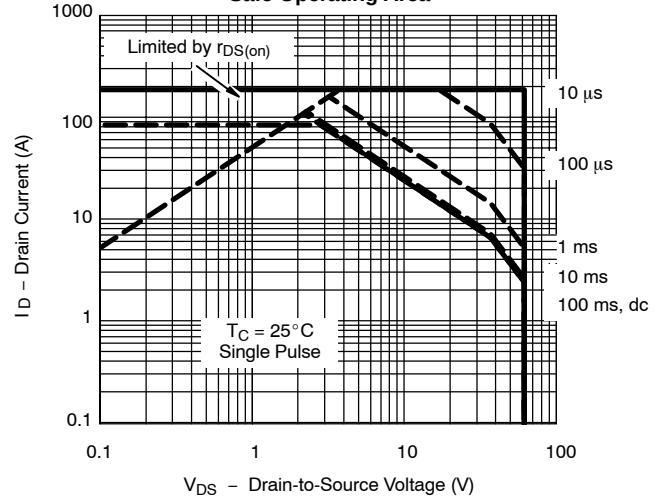


THERMAL RATINGS

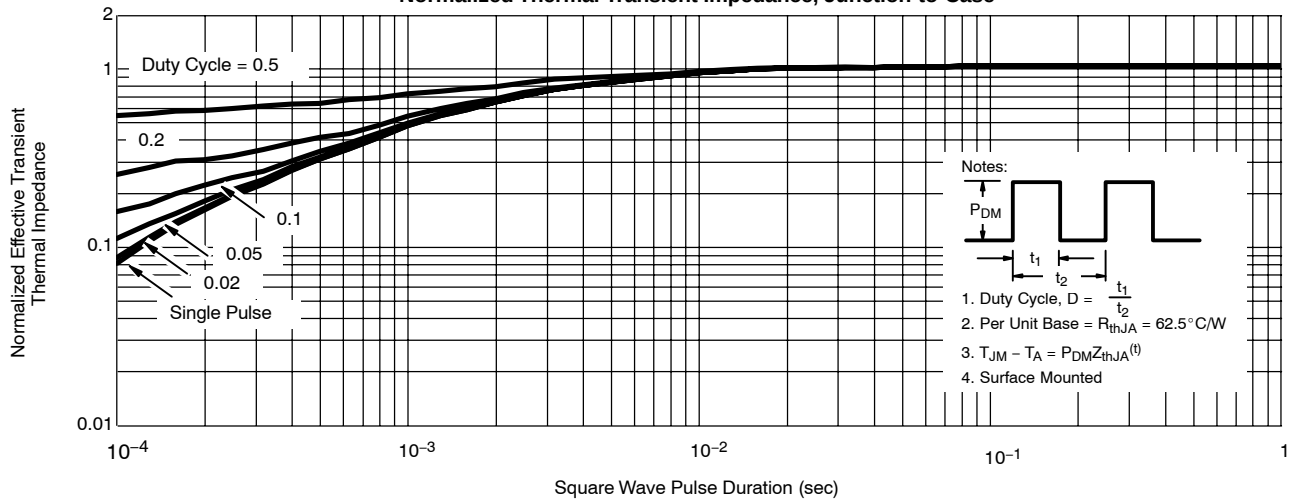
Maximum Avalanche and Drain Current
vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case





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