

SUP90P06-09L-VB Datasheet

P-Channel 60 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^c
- 60	0.0074 at $V_{GS} = -10$ V	- 90
	0.0094 at $V_{GS} = -4.5$ V	- 90

FEATURES

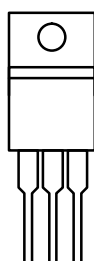
- Trench Power MOSFET
- Compliant to RoHS Directive 2002/95/EC


RoHS
 COMPLIANT

APPLICATIONS

- DC/DC Primary Switch

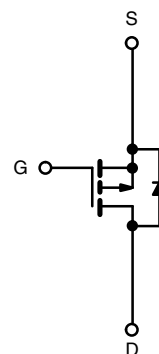
TO-220AB



G D S

Top View

Drain connected to Tab



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 (T _J = 175 °C) ^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.

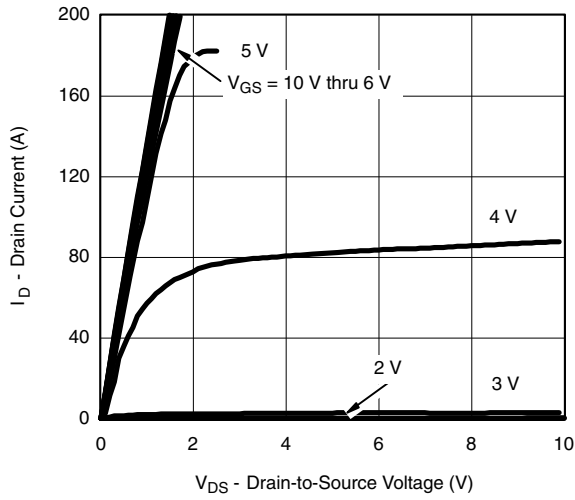
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 60			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1		- 3	
Gate-Body Leakage	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		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		
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		
Reverse 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

Notes:

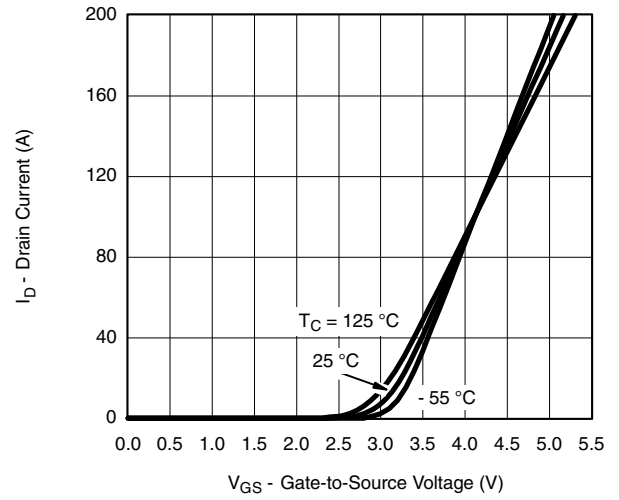
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

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.

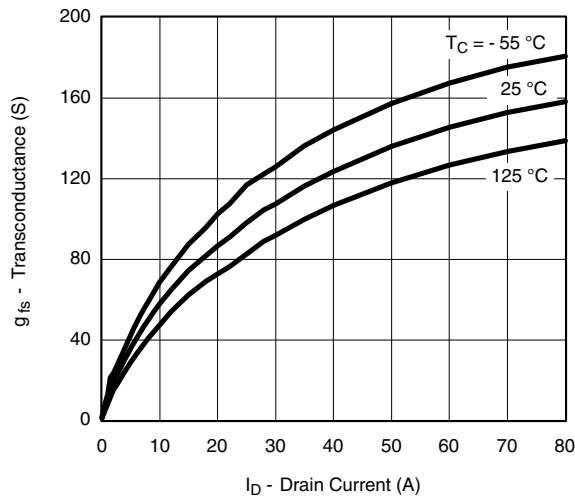
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



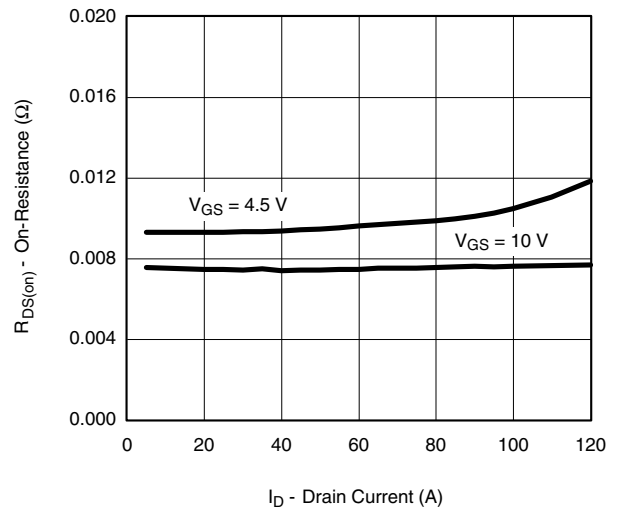
Output Characteristics



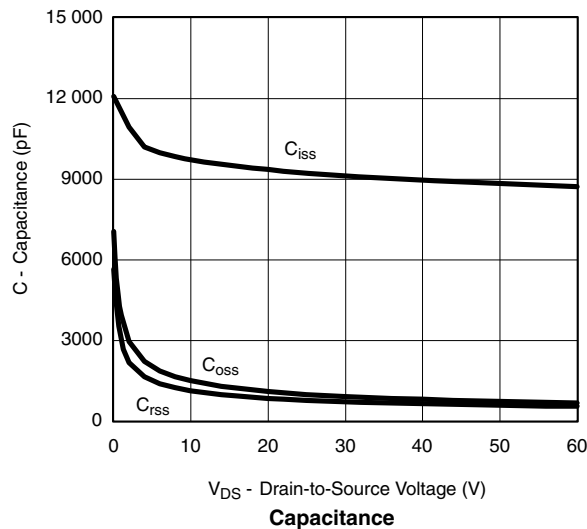
Transfer Characteristics



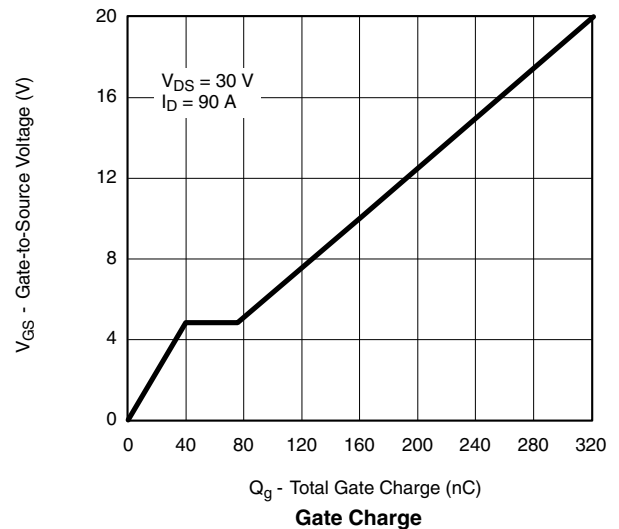
Transconductance



On-Resistance vs. Drain Current

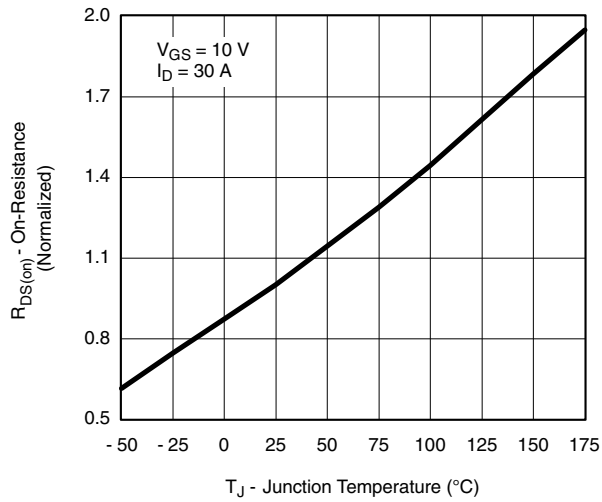


Capacitance

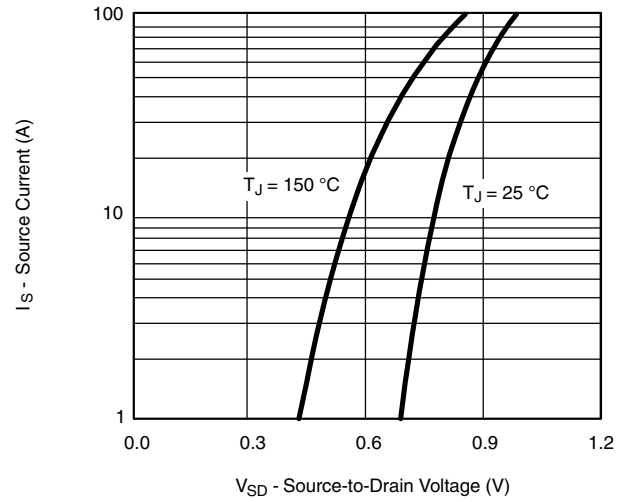


Gate Charge

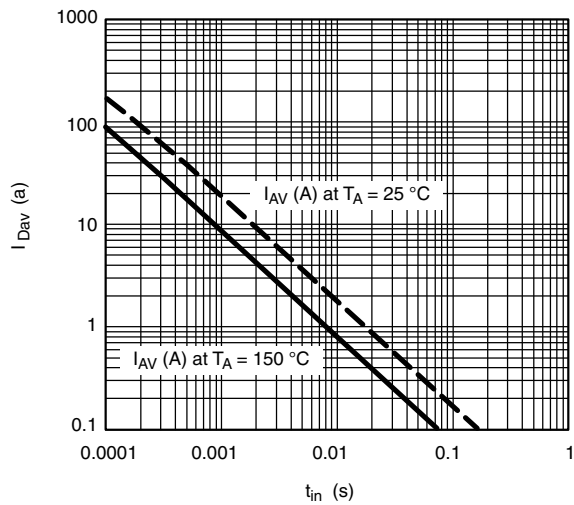
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



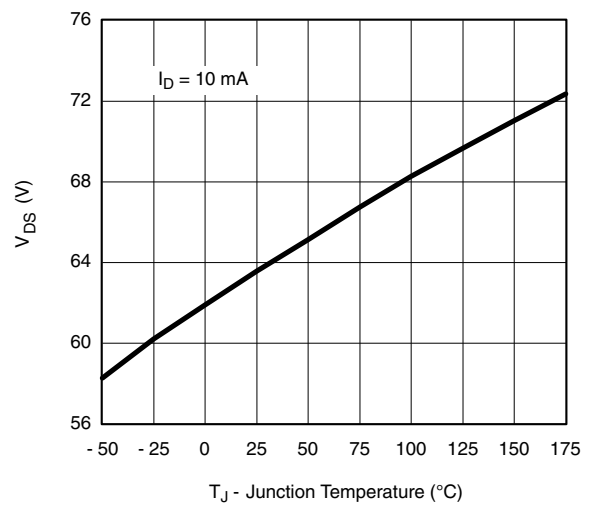
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

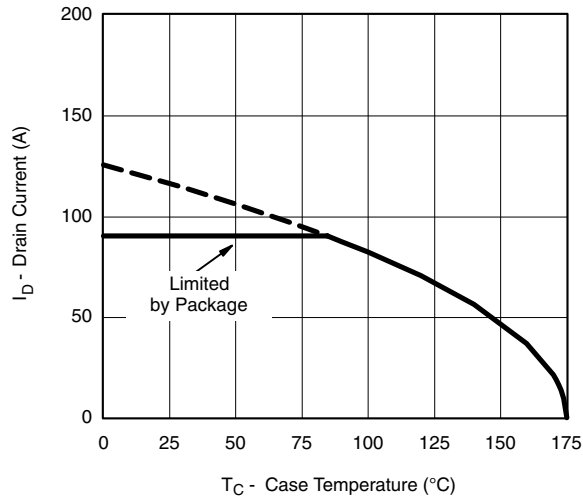


Avalanche Current vs. Time

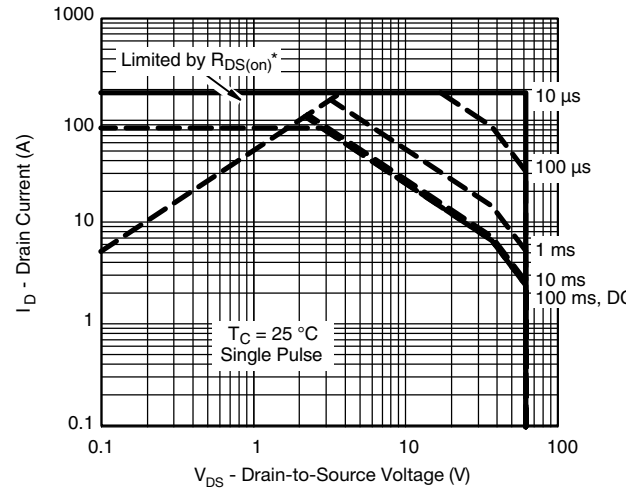


Drain Source Breakdown vs. Junction Temperature

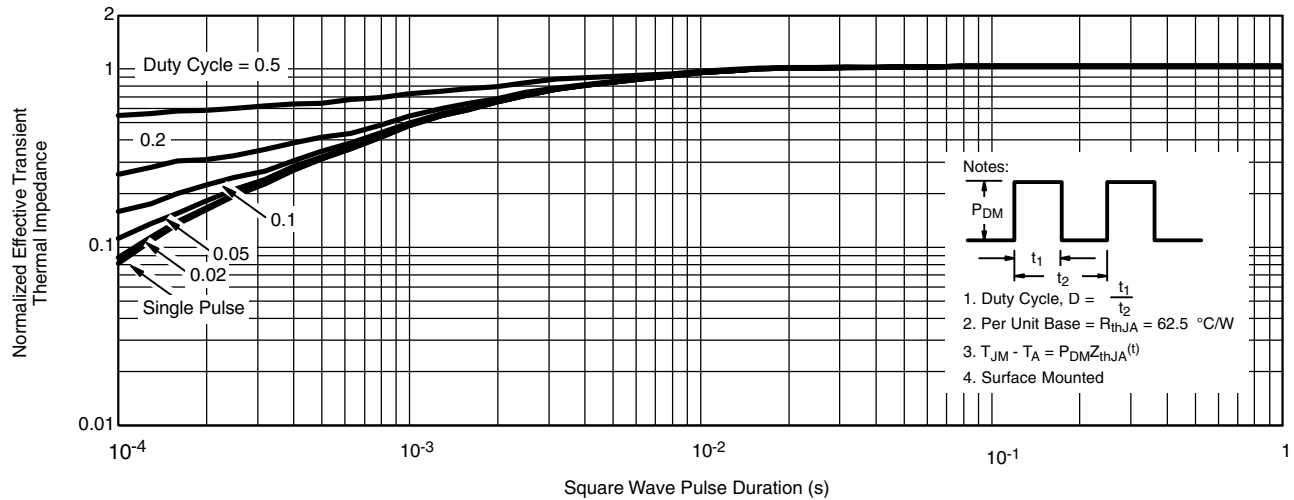
THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature

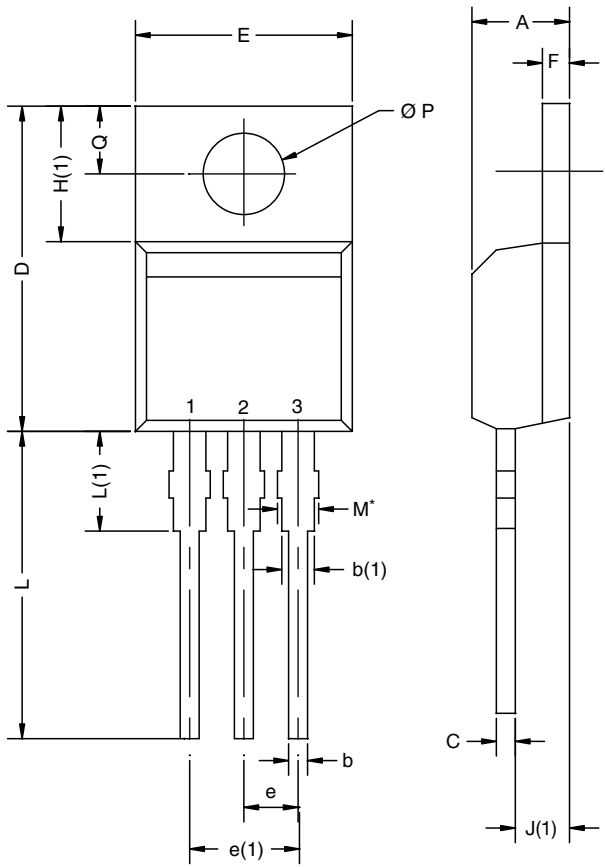


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

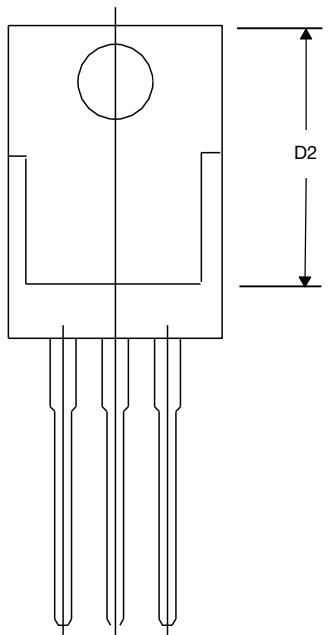
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DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
D2	12.19	12.70	0.480	0.500
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
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
$\varnothing P$	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: T14-0413-Rev. P, 16-Jun-14
DWG: 5471

Note
* $M = 1.32 \text{ mm to } 1.62 \text{ mm}$ (dimension including protrusion)
Heatsink hole for HVM



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