

SMOS4N90A1 SMOS4N90A2

N Channel Power MOSFETs

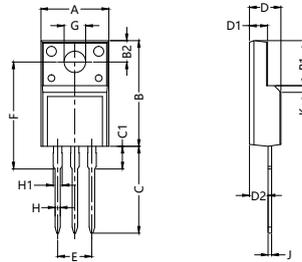
SMOS4N90A1



TO-220F

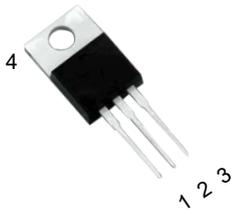
- 1, Gate
- 2, Drain
- 3, Source

Dimensions TO-220F



Dim.	Millimeter		Dim.	Millimeter	
	Min.	Max.		Min.	Max.
A	9.80	10.60	D2	2.30	3.30
B	15.40	16.40	E	5.08BSC	
B1	6.00	7.40	F	14.50	16.00
B2	3.20	3.80	ØG	2.90	3.40
C	12.80	13.50	H	0.60	1.00
C1	3.20	4.00	H1	1.15	1.55
D	4.35	4.95	J	0.35	0.65
D1	2.24	2.84	K	0.00	1.60

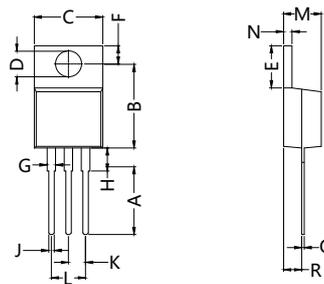
SMOS4N90A2



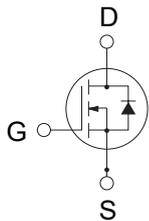
TO-220AB

- 1, Gate
- 2, Drain
- 3, Source
- 4, Drain Fin

Dimensions TO-220AB



Dim.	Millimeter	
	Min.	Max.
A	12.70	13.97
B	14.73	16.00
C	9.91	10.66
ØD	3.54	4.08
E	5.85	6.85
F	2.54	3.18
G	1.15	1.65
H	2.79	5.84
J	0.64	1.01
K	2.45BSC	
L	5.05BSC	
M	4.32	4.82
N	1.14	1.39
Q	0.35	0.56
R	2.29	2.79



G=Gate, D=Drain, S=Source

Absolute Maximum Ratings ($T_C=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	900	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous($T_C=25^\circ\text{C}$)	I_{D25}	4	A
Drain Current-Continuous($T_C=100^\circ\text{C}$)	I_{D100}	2.3	A
Pulsed Drain Current	I_{DM}	16	A
Maximum Power Dissipation	P_D	140	W
	P_D	47	W
Single pulse avalanche energy (Note 5)	E_{AS}	150	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Case (For SMOS4N90A2)	$R_{\theta JC}$	0.89	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case (For SMOS4N90A1)	$R_{\theta JC}$	2.66	$^\circ\text{C/W}$



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Electrical Characteristics

(T_J=25°C, unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	900	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =900V, V _{GS} =0V	-	-	10	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	3	4	5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{DS} =10V, I _D =2A	-	3.5	4.2	Ω
Forward Transconductance	g _{FS}	V _{DS} =50V, I _D =2A	-	5.0	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, F=1.0MHz	-	730	-	PF
Output Capacitance	C _{OSS}		-	65	-	PF
Reverse Transfer Capacitance	C _{RSS}		-	6.2	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =450V, I _D =4A V _{GS} =10V, R _G =25Ω	-	26	-	nS
Turn-on Rise Time	t _r		-	49	-	nS
Turn-Off Delay Time	t _{d(off)}		-	40	-	nS
Turn-Off Fall Time	t _f		-	34	-	nS
Total Gate Charge	Q _g	V _{DD} =720V, I _D =4A, V _{GS} =10V	-	15	22	nC
Gate-Source Charge	Q _{gs}		-	4.2	-	nC
Gate-Drain Charge	Q _{gd}		-	8.2	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =4A	-	-	1.5	V
Diode Forward Current (Note 2)	I _S		-	-	4	A
Reverse Recovery Time	t _{rr}	T _J =25°C, I _F =4A di/dt=100A/μs (Note3)	-	450	-	nS
Reverse Recovery Charge	Q _{rr}		-	4.0	-	uC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : T_J=25°C, V_{DD}=30V, V_G=10V, L=0.4mH, R_G=25Ω



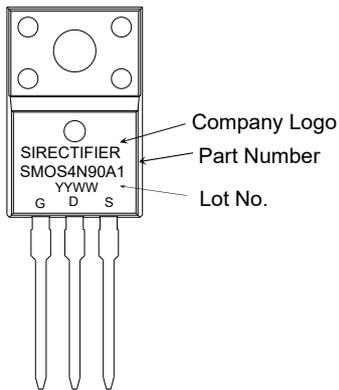
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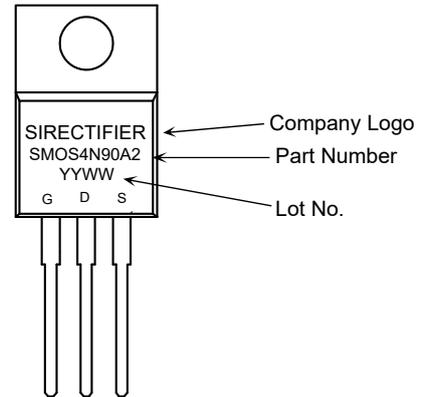
N Channel Power MOSFETs

Marking

SMOS4N90A1
(TO-220F)



SMOS4N90A2
(TO-220AB)



Ordering Information

Part Number	Package	Shipping	Marking Code
SMOS4N90A1	TO-220F	50pcs / Tube	SMOS4N90A1
SMOS4N90A2	TO-220AB	50pcs / Tube	SMOS4N90A2

SMOS4N90A1 SMOS4N90A2

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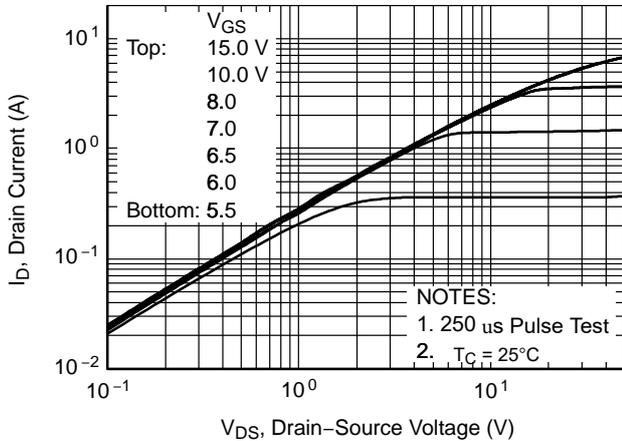


Figure 1. On-Region Characteristics

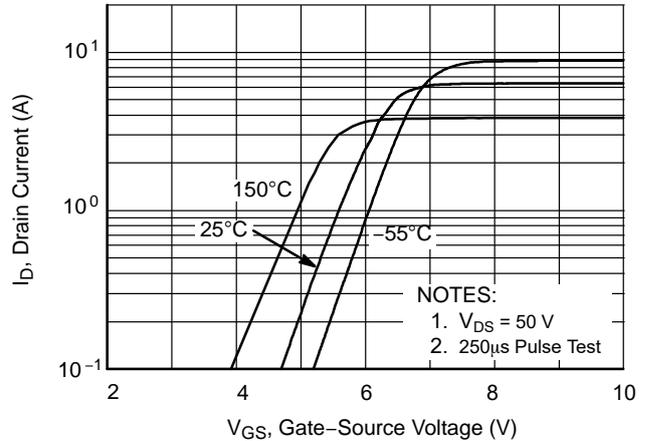


Figure 2. Transfer Characteristics

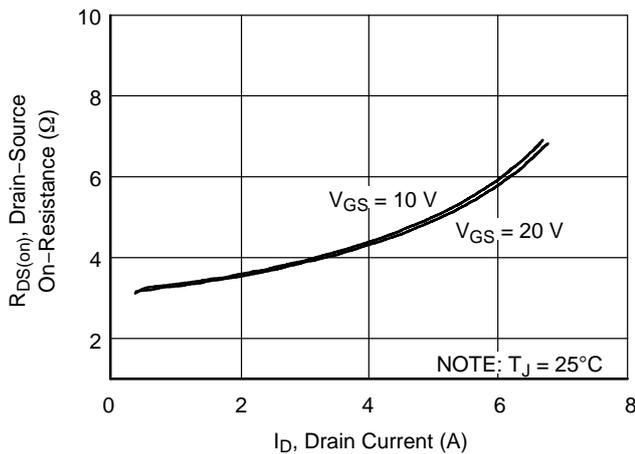


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

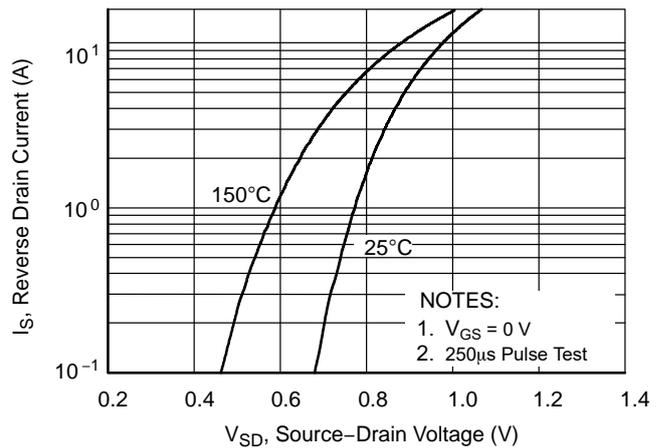


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

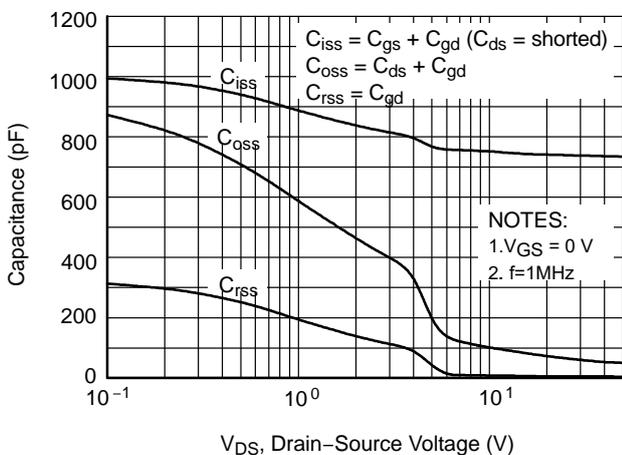


Figure 5. Capacitance Characteristics

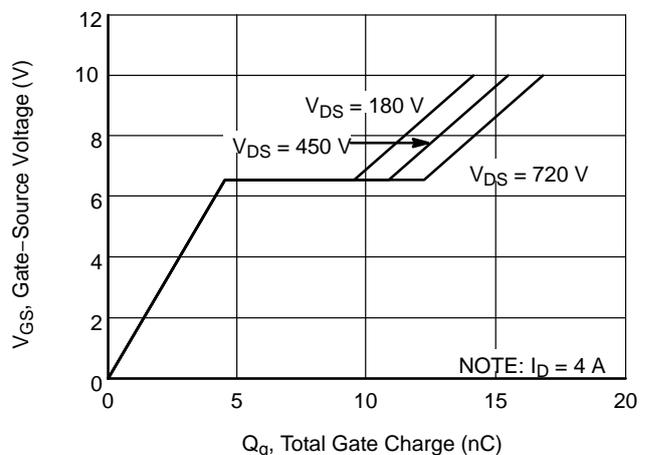


Figure 6. Gate Charge Characteristics



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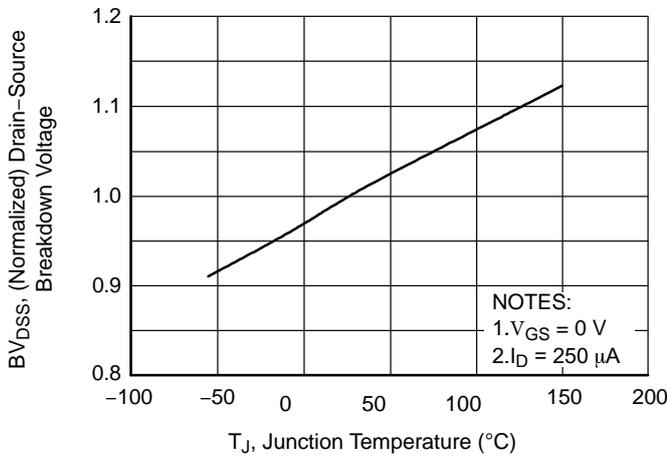


Figure 7. Breakdown Voltage Variation vs. Temperature

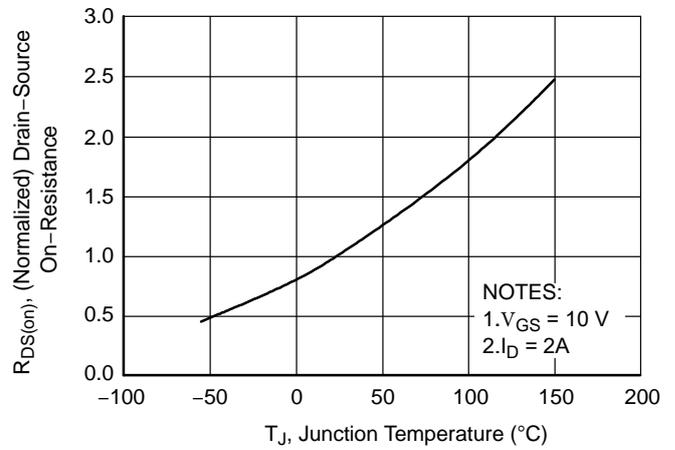


Figure 8. On-Resistance Variation vs. Temperature

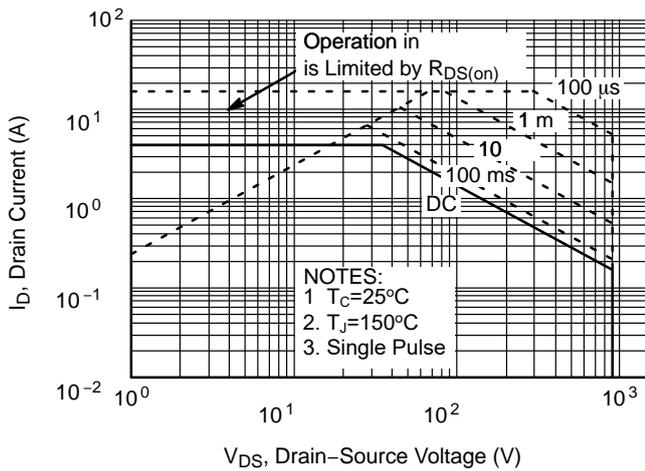


Figure 9. Maximum Safe Operating Area for SMOS4N90A2

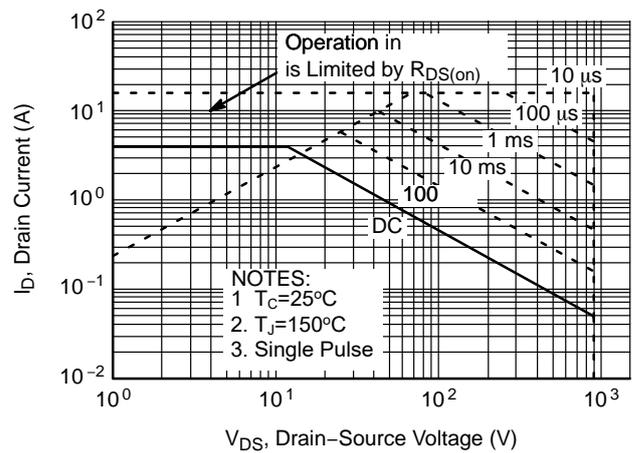


Figure 10. Maximum Safe Operating Area for SMOS4N90A1

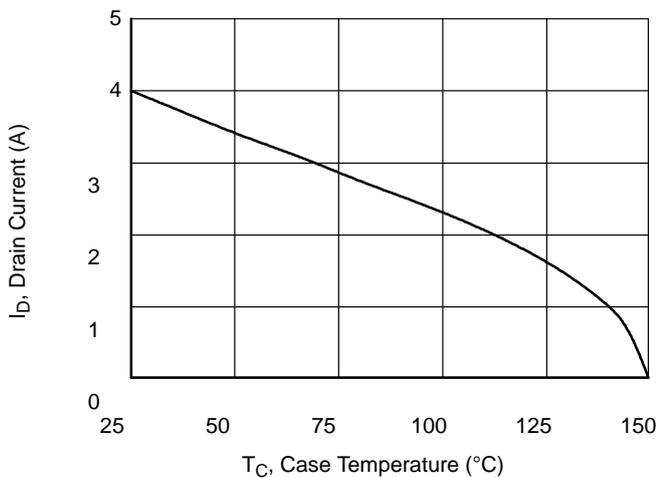


Figure 11. Maximum Drain Current vs. Case Temperature

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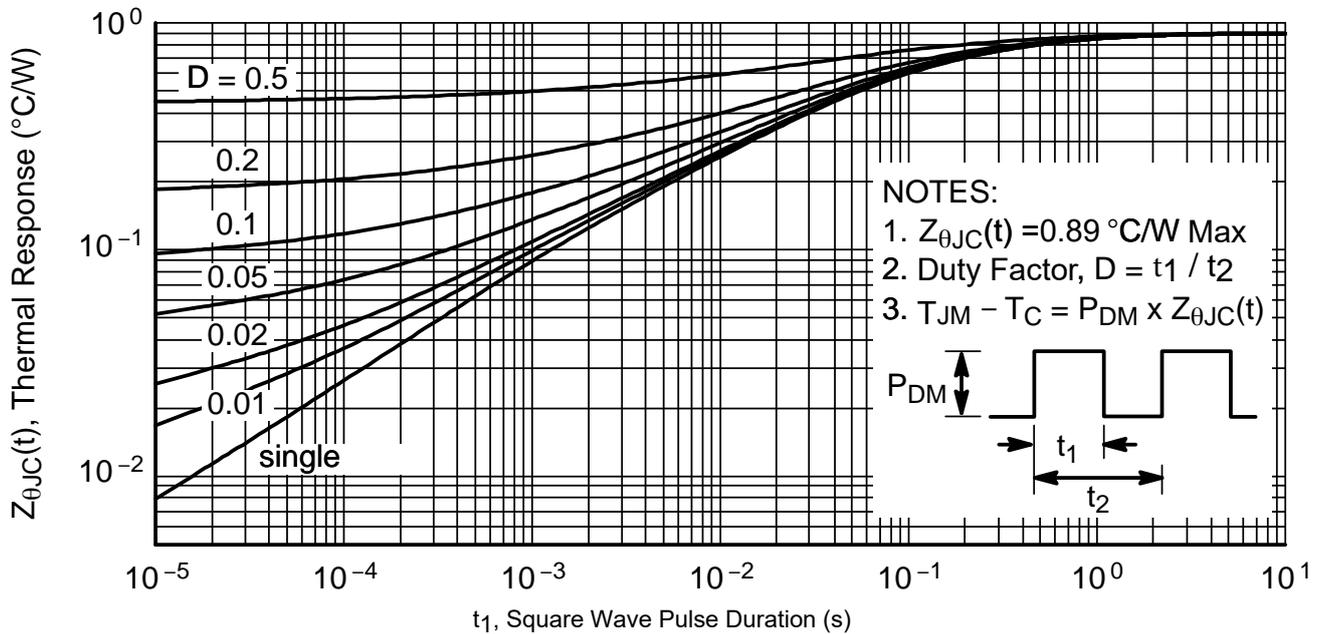


Figure 12. Transient Thermal Response Curve for SMOS4N90A2

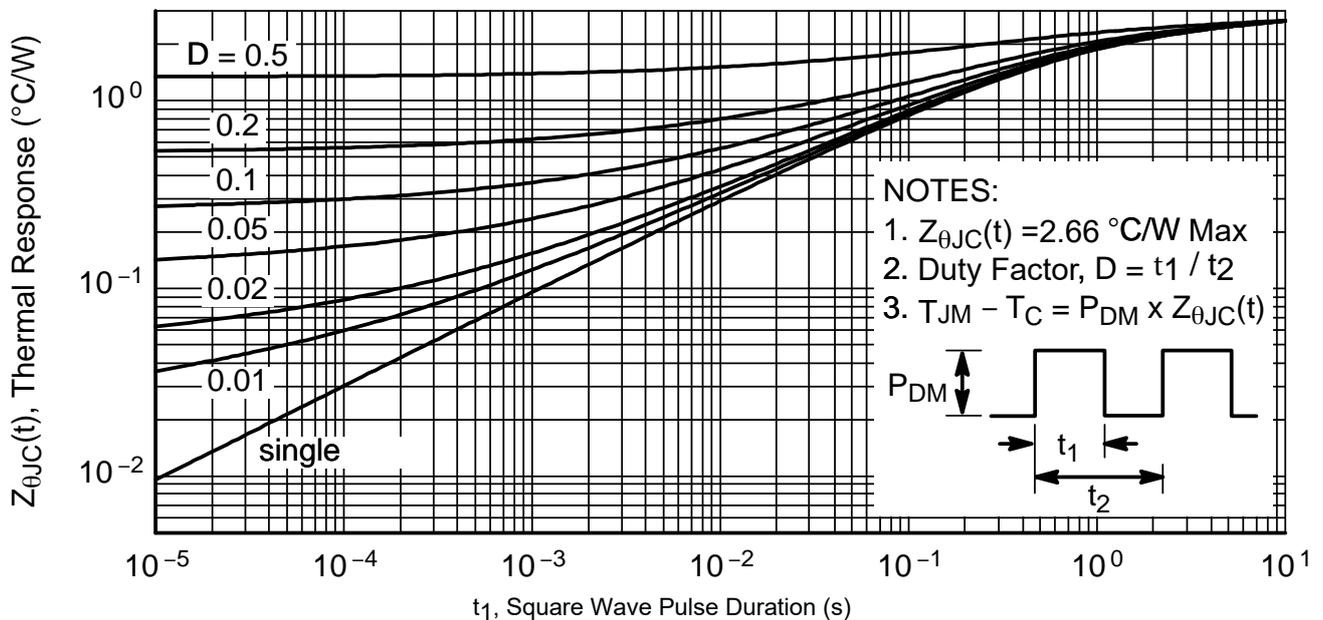
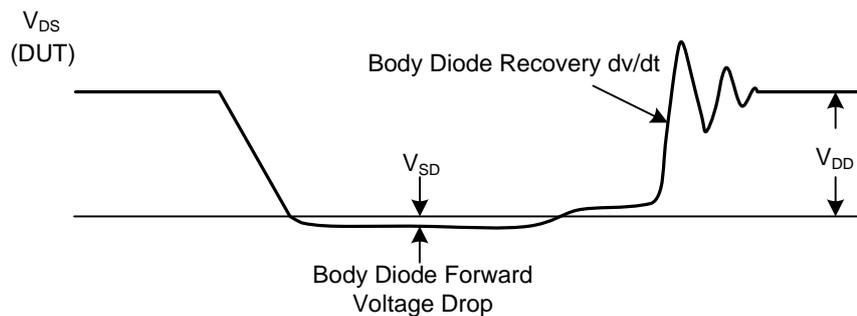
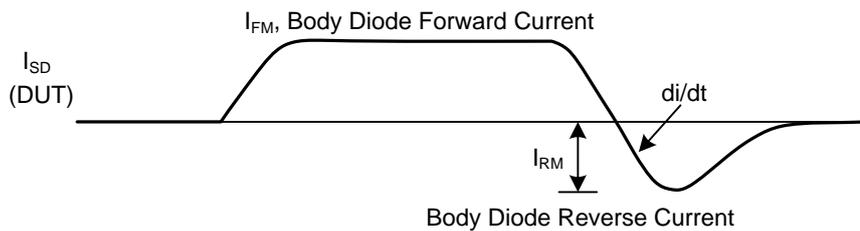
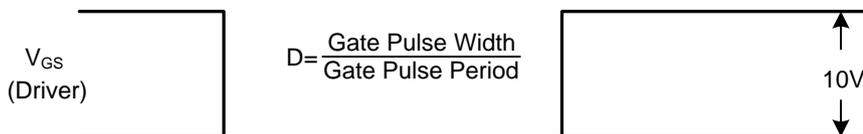
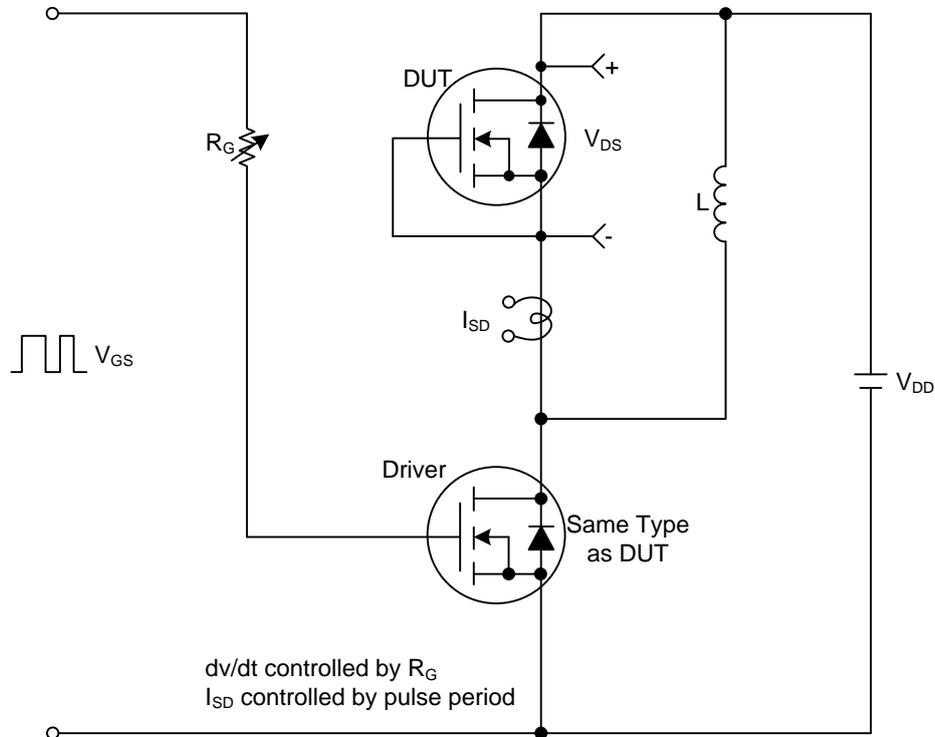


Figure 13. Transient Thermal Response Curve for SMOS4N90A1

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N Channel Power MOSFETs

Peak Diode Recovery dv/dt Test Circuit & Waveforms



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