



# SPN9910 N-Channel Enhancement Mode MOSFET

## DESCRIPTION

The SPN9910 is the N-Channel logic enhancement mode power field effect transistors are produced using high cell density, DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for most of synchronous buck converter applications.

## FEATURES

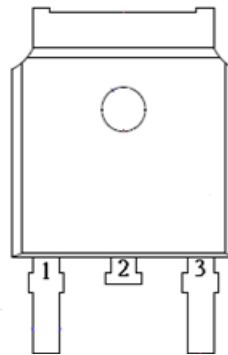
- ◆ 60V/60A,  $R_{DS(ON)}=10m\Omega@V_{GS}=10V$
- ◆ 60V/60A,  $R_{DS(ON)}=12.0m\Omega@V_{GS}=4.5V$
- ◆ Super high density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-252-2L/TO-251S-3L package design

## APPLICATIONS

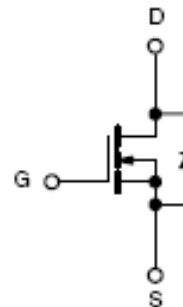
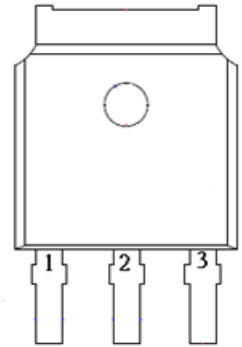
- DC/DC Converter
- Load Switch
- Synchronous Buck Converter

## PIN CONFIGURATION

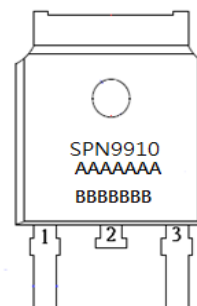
TO-252



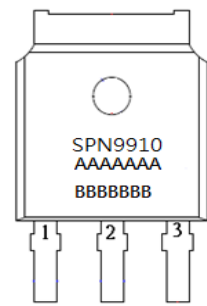
TO-251



## PART MARKING



A : Lot Code  
B : Date Code



A : Lot Code  
B : Date Code



# SPN9910

## N-Channel Enhancement Mode MOSFET

### PIN DESCRIPTION

Pin	Symbol	Description
1	G	Gate
2	D	Drain
3	S	Source

### ORDERING INFORMATION

Part Number	Package	Part Marking
SPN9910T252RGB	TO-252-2L	SPN9910
SPN9910ST251TGB	TO-251S-3L	SPN9910

※ SPN9910T252RGB: Tape Reel ; Pb – Free; Halogen – Free

※ SPN9910ST251TGB: Tube ; Pb – Free; Halogen – Free

### ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit	
Drain-Source Voltage	V <sub>DSS</sub>	60	V	
Gate –Source Voltage	V <sub>GSS</sub>	±20	V	
Continuous Drain Current(T <sub>J</sub> =150°C)	I <sub>D</sub>	TA=25°C	60	A
		TA=100°C	47	
Pulsed Drain Current	I <sub>DM</sub>	120	A	
Avalanche Current	I <sub>AS</sub>	38	A	
Power Dissipation	P <sub>D</sub>	40	W	
Avalanche Energy with Single Pulse ( T <sub>J</sub> =25°C , L = 0.1mH , I <sub>AS</sub> = 38A , V <sub>DD</sub> = 25V. )	E <sub>AS</sub>	123	mJ	
Operating Junction Temperature	T <sub>J</sub>	-55/150	°C	
Storage Temperature Range	T <sub>STG</sub>	-55/150	°C	
Thermal Resistance-Junction to Ambient	R <sub>θJA</sub>	62	°C/W	



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### ELECTRICAL CHARACTERISTICS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	60			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0		2.5	V
Gate Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=48V, V_{GS}=0V$			1	uA
		$V_{DS}=48V, V_{GS}=0V$ $T_J=55^\circ C$			5	
On-State Drain Current	$I_{D(on)}$	$V_{DS}\geq 5V, V_{GS}=10V$	60			A
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=15A$		10	12	mΩ
		$V_{GS}=4.5V, I_D=10A$		12	15	
Forward Transconductance	$g_{fs}$	$V_{DS}=5V, I_D=15A$		47		S
Diode Forward Voltage	$V_{SD}$	$I_S=60A, V_{GS}=0V$			1.2	V
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS}=48V, V_{GS}=4.5V$ $I_D=12A$		24		nC
Gate-Source Charge	$Q_{gs}$			6.9		
Gate-Drain Charge	$Q_{gd}$			10		
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V$ $f=1MHz$		3200		pF
Output Capacitance	$C_{oss}$			210		
Reverse Transfer Capacitance	$C_{rss}$			145		
Turn-On Time	$t_{d(on)}$	$V_{DD}=30V, I_D=2A,$ $V_{GEN}=10V, R_G=3.3\Omega$		20		nS
	$t_r$			4		
Turn-Off Time	$t_{d(off)}$			84.5		
	$t_f$			6.5		



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## TYPICAL CHARACTERISTICS

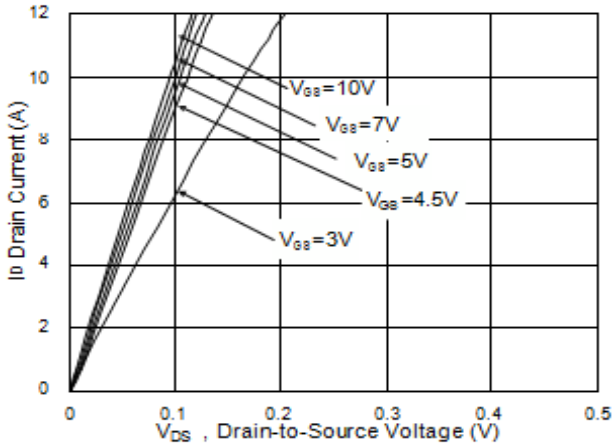


Fig. 1 Typical Output Characteristics

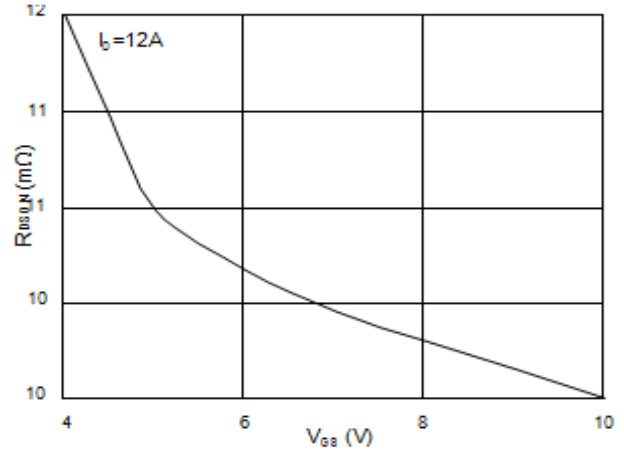


Fig. 2 On-Resistance vs. Gate Voltage

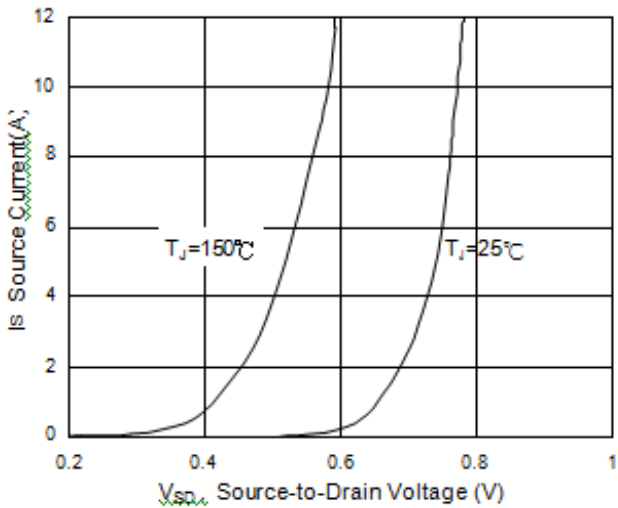


Fig. 3 Forward Characteristics  
Reverse Diodes

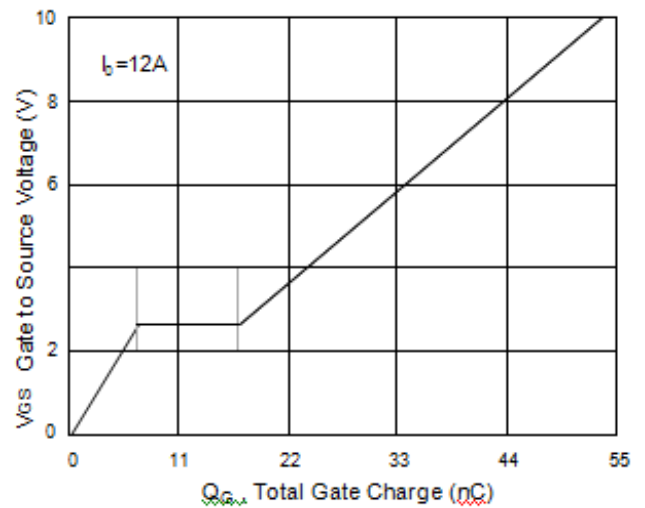


Fig. 4 Gate Charge Characteristics

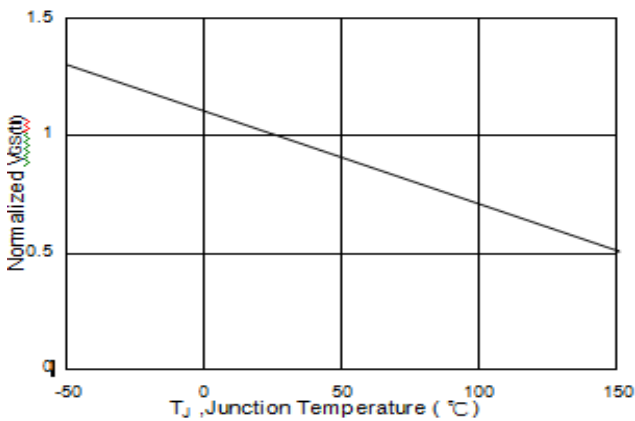


Fig. 5 Vgs vs. Junction Temperature

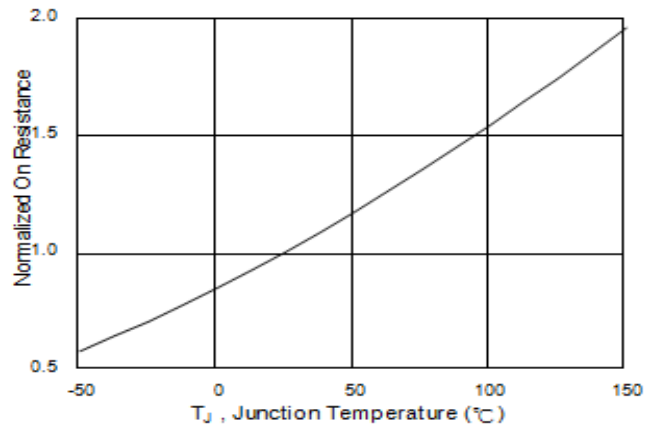


Fig. 6 On-Resistance vs. Temperature



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## TYPICAL CHARACTERISTICS

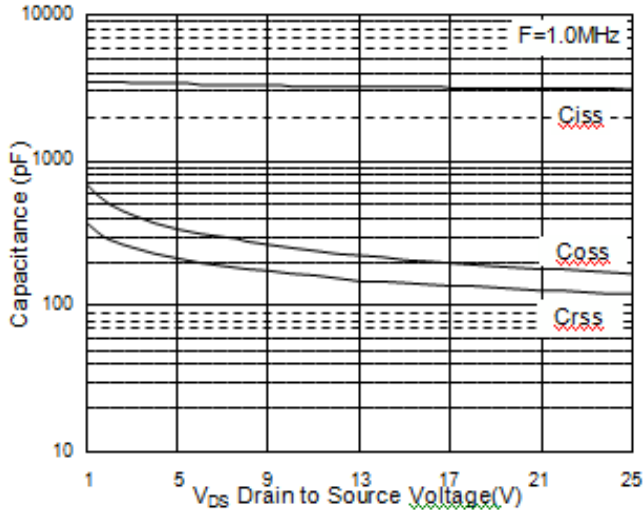


Fig. 7 Typical Capacitance Characteristics

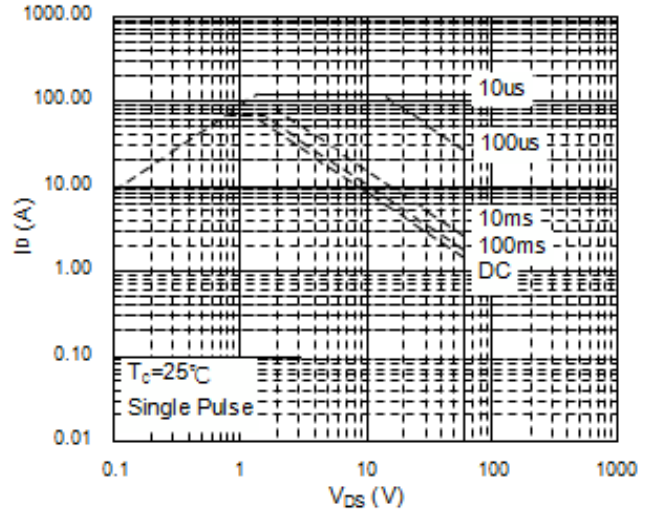


Fig. 8 Maximum Safe Operation Area

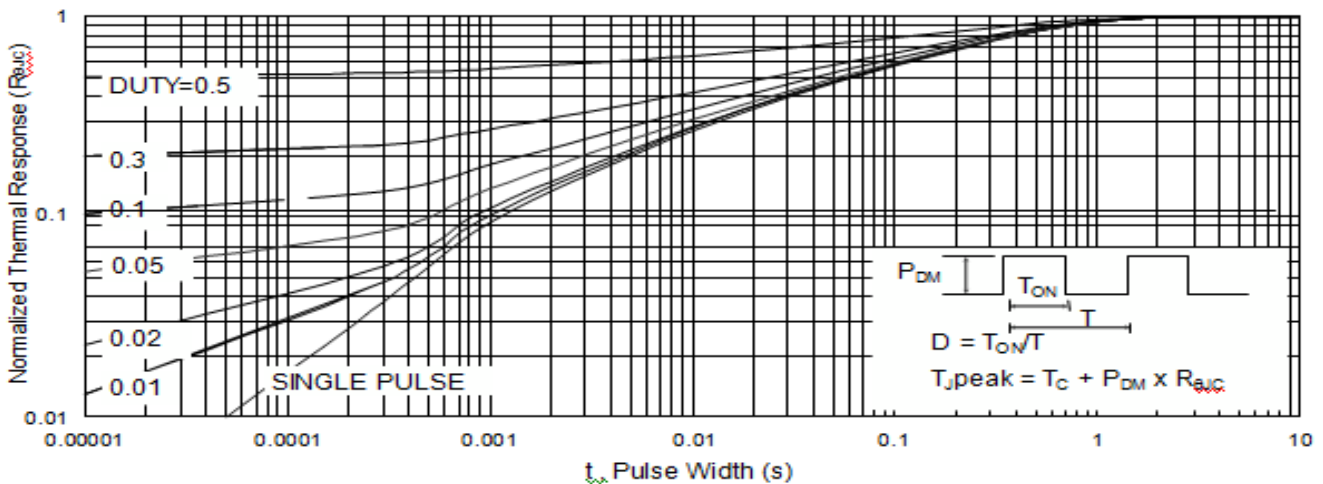


Fig. 9 Effective Transient Thermal Impedance

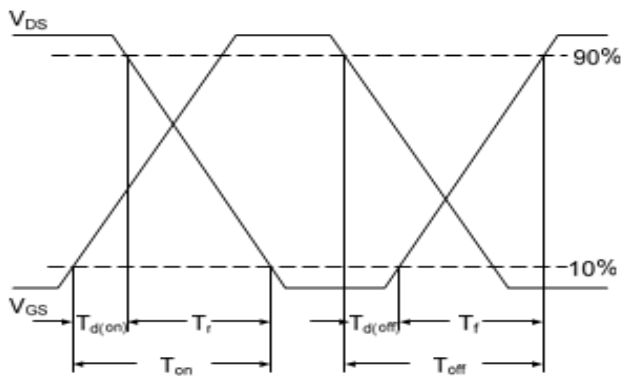


Fig. 10 Switching Time Waveform

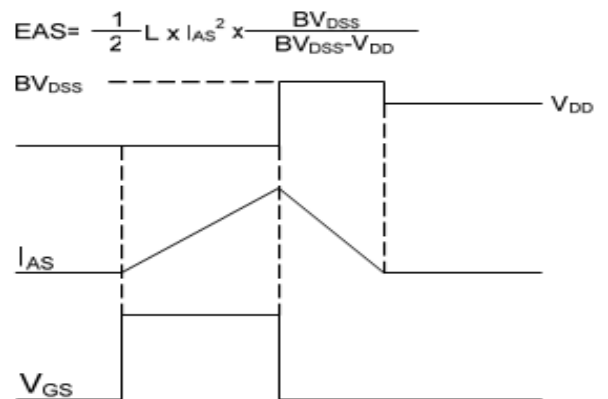


Fig. 11 Unclamped Inductive Waveform



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