



# SPN3004 N-Channel Enhancement Mode MOSFET

## DESCRIPTION

The SPN3004 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 low voltage application , notebook computer power management and other battery powered circuits where high-side switching .

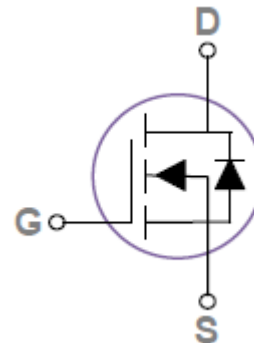
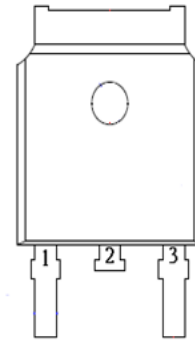
## FEATURES

- ◆ 30V/96A, $R_{DS(ON)}=4.2m\Omega@V_{GS}=10V$
- ◆ 30V/96A, $R_{DS(ON)}=6.0m\Omega@V_{GS}=4.5V$
- ◆ Super high density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-252-2L package design

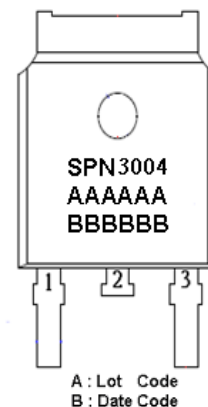
## APPLICATIONS

- MB/VGA/Vcore
- POL Applications
- SMPS 2<sup>nd</sup> SR
- High Frequency Synchronous Buck Converter
- DC/DC Power System
- Load Switch

## PIN CONFIGURATION(TO-252-2L)



## PART MARKING



A : Lot Code  
B : Date Code



# SPN3004

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### PIN DESCRIPTION

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

### ORDERING INFORMATION

Part Number	Package	Part Marking
SPN3004T252RGB	TO-252-2L	SPN3004

※ SPN3004T252RGB : Tape Reel ; Pb – Free; Halogen - Free

### ABSOLUTE MAXIMUM RATINGS

( $T_A=25^{\circ}\text{C}$  Unless otherwise noted)

Parameter	Symbol	Typical	Unit	
Drain-Source Voltage	$V_{DS}$	30	V	
Gate –Source Voltage	$V_{GS}$	$\pm 20$	V	
Continuous Drain Current( $T_J=150^{\circ}\text{C}$ )	$I_D$	$T_A=25^{\circ}\text{C}$	96	A
		$T_A=100^{\circ}\text{C}$	68	
Pulsed Drain Current	$I_{DM}$	192	A	
Avalanche Current	$I_{AS}$	53.8	A	
Single Pulse Avalanche Energy	$E_{AS}$	317	mJ	
Power Dissipation	$P_D$	93	W	
Operating Junction Temperature	$T_J$	-55/150	$^{\circ}\text{C}$	
Storage Temperature Range	$T_{STG}$	-55/150	$^{\circ}\text{C}$	
Thermal Resistance-Junction to Ambient	$R_{\theta JA}$	62	$^{\circ}\text{C}/\text{W}$	



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### ELECTRICAL CHARACTERISTICS

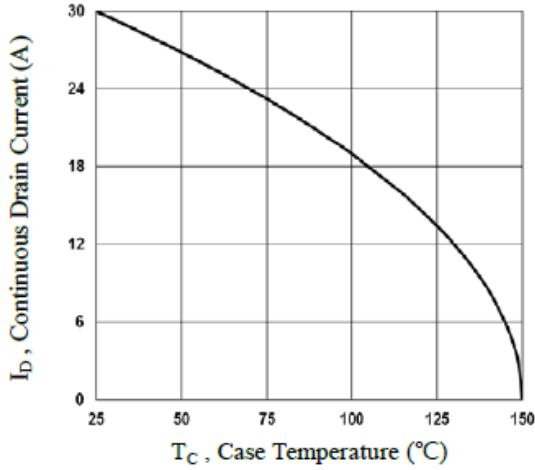
(TA=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	30			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.2	1.6	2.5	
Gate Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=24V, V_{GS}=0V,$ $T_J=25^\circ C$			1	uA
		$V_{DS}=24V, V_{GS}=0V,$ $T_J=125^\circ C$			10	
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$		3.8	4.2	mΩ
		$V_{GS}=4.5V, I_D=15A$		5.2	6.0	
Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_D=6A$		12		S
Diode Forward Voltage	$V_{SD}$	$I_F=1A, V_{GS}=0V$			1	V
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS}=15V, V_{GS}=4.5V,$ $I_D=12A$		24	34	nC
Gate-Source Charge	$Q_{gs}$			4.2	6	
Gate-Drain Charge	$Q_{gd}$			13	18	
Input Capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=25V,$ $F=1MHz$		2200	3190	pF
Output Capacitance	$C_{oss}$			280	405	
Reverse Transfer Capacitance	$C_{rss}$			177	255	
Turn-On Time	$t_{d(on)}$	$(V_{DD}=15V, I_D=15A,$ $V_{GEN}=10V, R_G=3.3\Omega)$		12.6	24	nS
	$t_r$			19.5	37	
Turn-Off Time	$t_{d(off)}$			42.8	81	
	$t_f$			13.2	25	

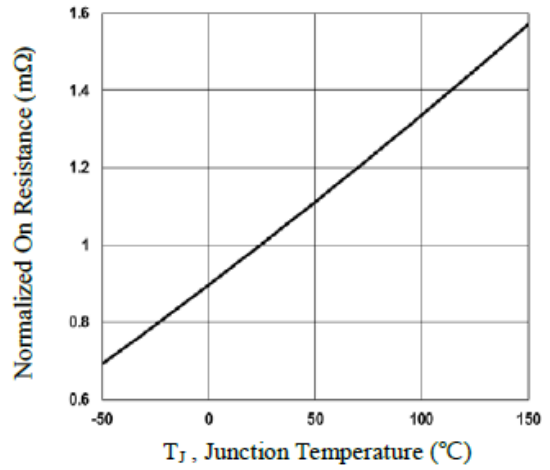


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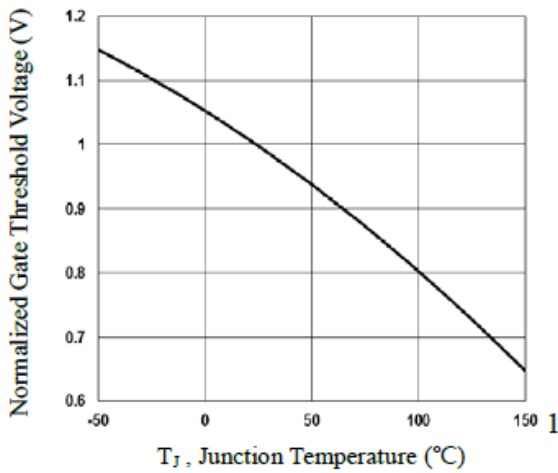
## TYPICAL CHARACTERISTICS



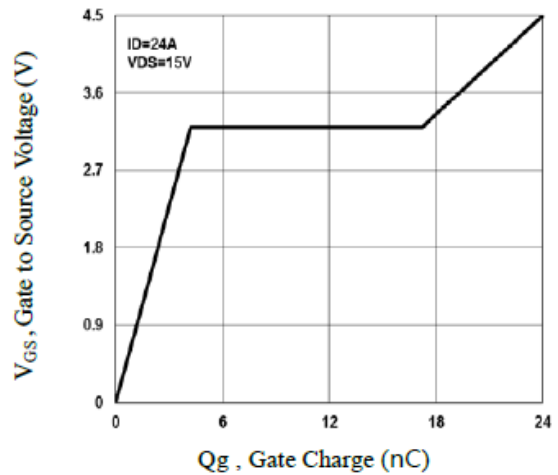
**Fig.1 Continuous Drain Current vs.  $T_C$**



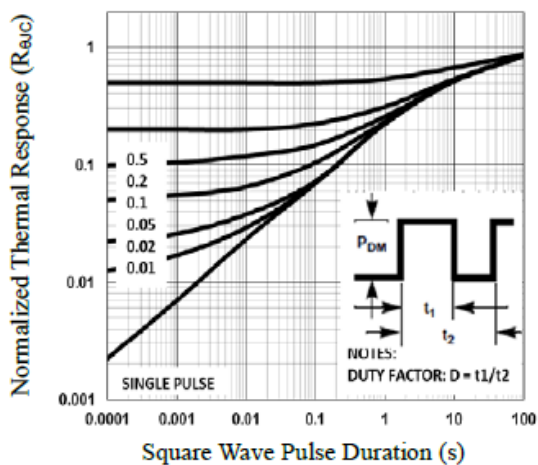
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_J$**



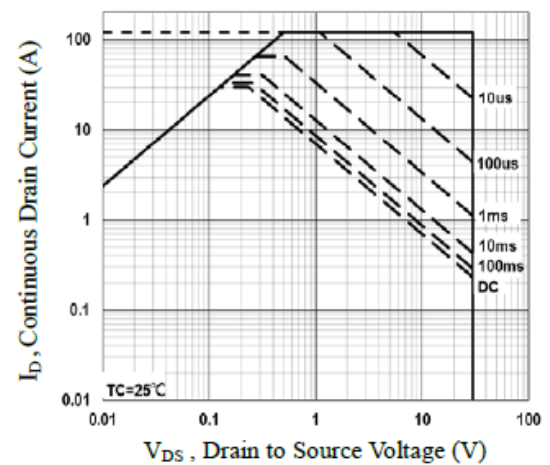
**Fig.3 Normalized  $V_{th}$  vs.  $T_J$**



**Fig.4 Gate Charge Waveform**



**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**



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## TYPICAL CHARACTERISTICS

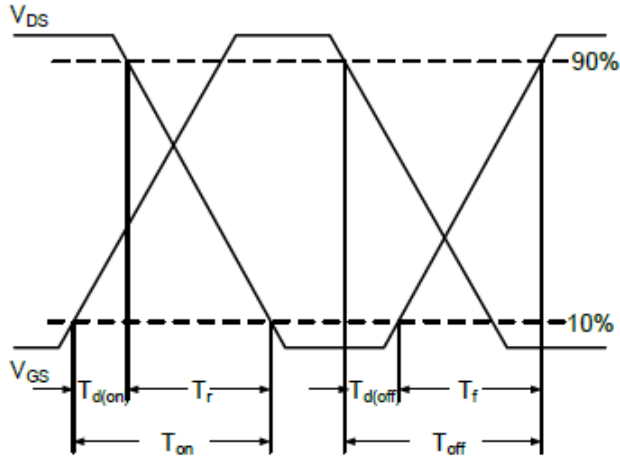


Fig.7 Switching Time Waveform

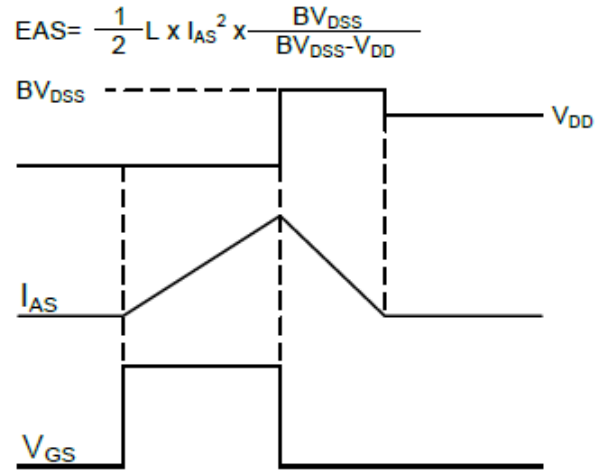


Fig.8 EAS Waveform



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