



# SPN3006

## N-Channel Enhancement Mode MOSFET

### DESCRIPTION

The SPN3006 is the N-Channel logic enhancement mode power field effect transistors are produced using high cell density, DMOS trench technology. The SPN3006 has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low  $R_{DS(ON)}$  and fast switching speed.

### FEATURES

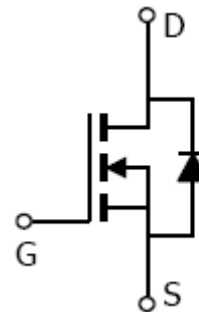
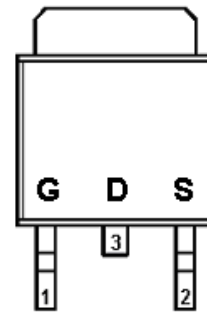
- ◆ 30V/30A,  $R_{DS(ON)} = 4.7m\Omega @ V_{GS} = 10V$
- ◆ 30V/15A,  $R_{DS(ON)} = 7.5m\Omega @ V_{GS} = 4.5V$
- ◆ Super high density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-252 package design

### APPLICATIONS

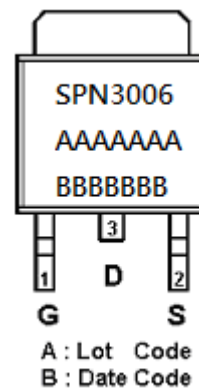
- High Frequency Synchronous Buck Converter
- DC/DC Power System
- Load Switch

### PIN CONFIGURATION

TO-252



### PART MARKING





# SPN3006

## N-Channel Enhancement Mode MOSFET

### PIN DESCRIPTION

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

### ORDERING INFORMATION

Part Number	Package	Part Marking
SPN3006T252RGB	TO-252	SPN3006

※ SPN3006T252RGB : 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	$V_{DSS}$	30	V	
Gate –Source Voltage	$V_{GSS}$	$\pm 20$	V	
Continuous Drain Current	$I_D$	$T_A=25^{\circ}\text{C}$	80	A
		$T_A=100^{\circ}\text{C}$	57	
Pulsed Drain Current	$I_{DM}$	160	A	
Avalanche Current	$I_{AS}$	48	A	
Single Pulse Avalanche Energy	EAS	259	mJ	
Power Dissipation	$P_D$	6	W	
Operating Junction Temperature	$T_J$	150	$^{\circ}\text{C}$	
Storage Temperature Range	$T_{STG}$	-55/150	$^{\circ}\text{C}$	
Thermal Resistance-Junction to Ambient ( $t \leq 10\text{s}$ )	$R_{\theta JA}$	25	$^{\circ}\text{C}/\text{W}$	



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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	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0		2.5	
Gate Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=24V, V_{GS}=0V$			1	uA
		$V_{DS}=24V, V_{GS}=0V, T_J=55^\circ C$			5	
On-State Drain Current	$I_{D(on)}$	$V_{DS}\geq 5V, V_{GS}=10V$			80	A
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$		4.7	5.5	mΩ
		$V_{GS}=4.5V, I_D=15A$		7.5	9	
Forward Transconductance	$g_{fs}$	$V_{DS}=5V, I_D=30A$		22		S
Diode Forward Voltage	$V_{SD}$	$I_S=1A, V_{GS}=0V$			1	V
Single Pulse Avalanche Energy	EAS	$V_{DD}=25V, L=0.1mH, I_{AS}=24A$	60			mJ
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS}=15V, V_{GS}=4.5V, I_D=15A$		20	18	nC
Gate-Source Charge	$Q_{gs}$			7.6		
Gate-Drain Charge	$Q_{gd}$			7.2		
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V, f=1MHz$		2300		pF
Output Capacitance	$C_{oss}$			265		
Reverse Transfer Capacitance	$C_{rss}$			210		
Turn-On Time	$t_{d(on)}$	$V_{DD}=15V, I_D=15A, V_{GEN}=10V, R_G=3.3\Omega$		7.8	15	nS
	$t_r$			15	12	
Turn-Off Time	$t_{d(off)}$			37	30	
	$t_f$			10.6	15	



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## TYPICAL CHARACTERISTICS

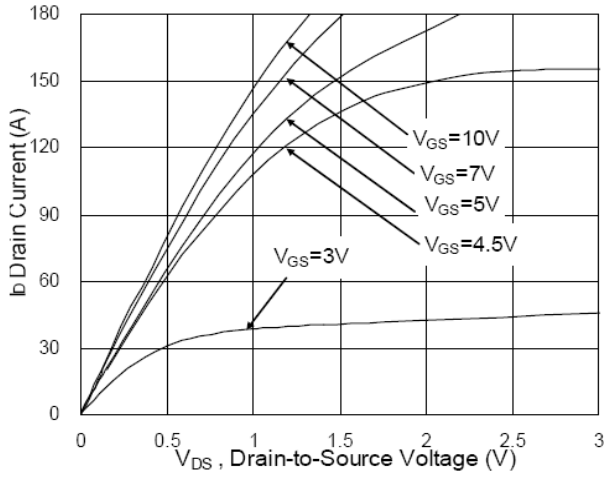


Fig. 1 Typical Output Characteristics

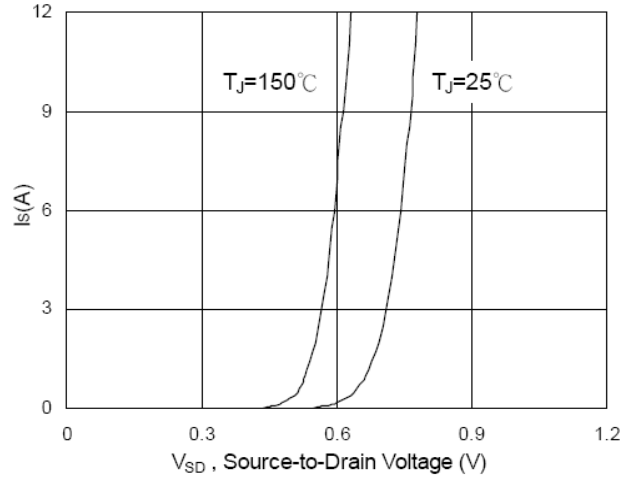


Fig. 2 Transfer Characteristics

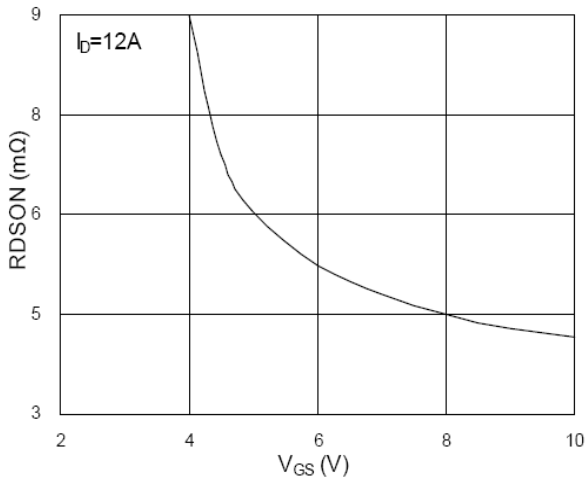


Fig. 3 On-Resistance vs Gate voltage

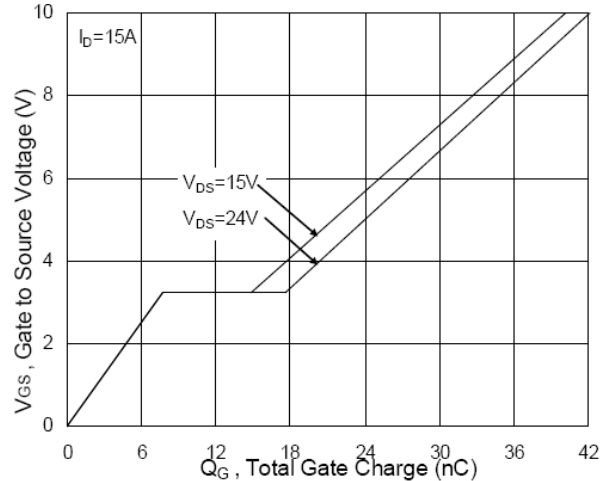


Fig. 4 Gate Charge Characteristics

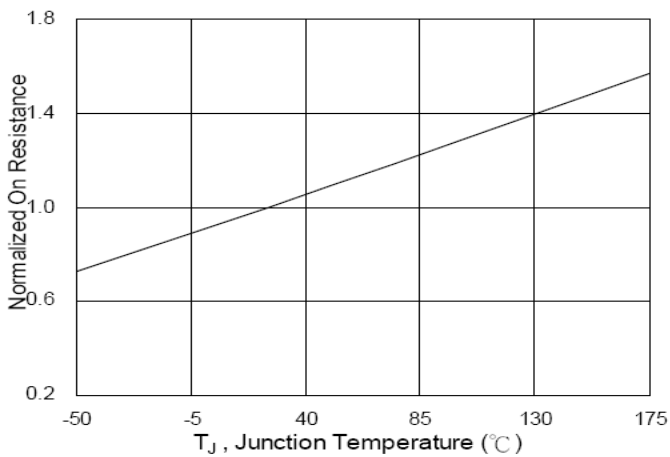


Fig. 5 On-Resistance vs Junction Temp

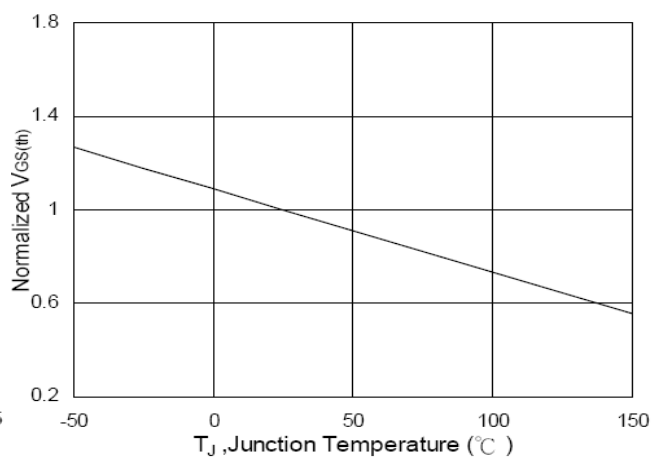


Fig. 6 Vgs vs Junction Temperature



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## TYPICAL CHARACTERISTICS

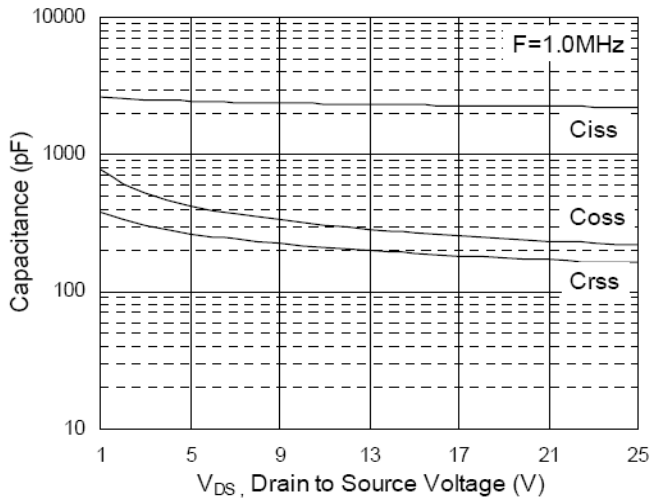


Fig. 7 Typical Capacitance Characteristics

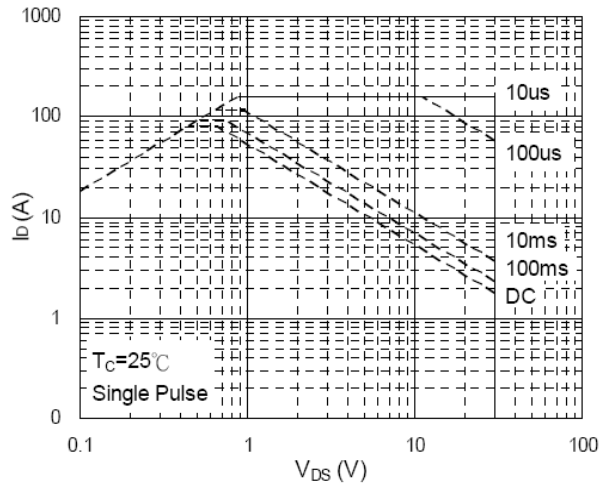


Fig. 8 Maximum Safe Operation Area

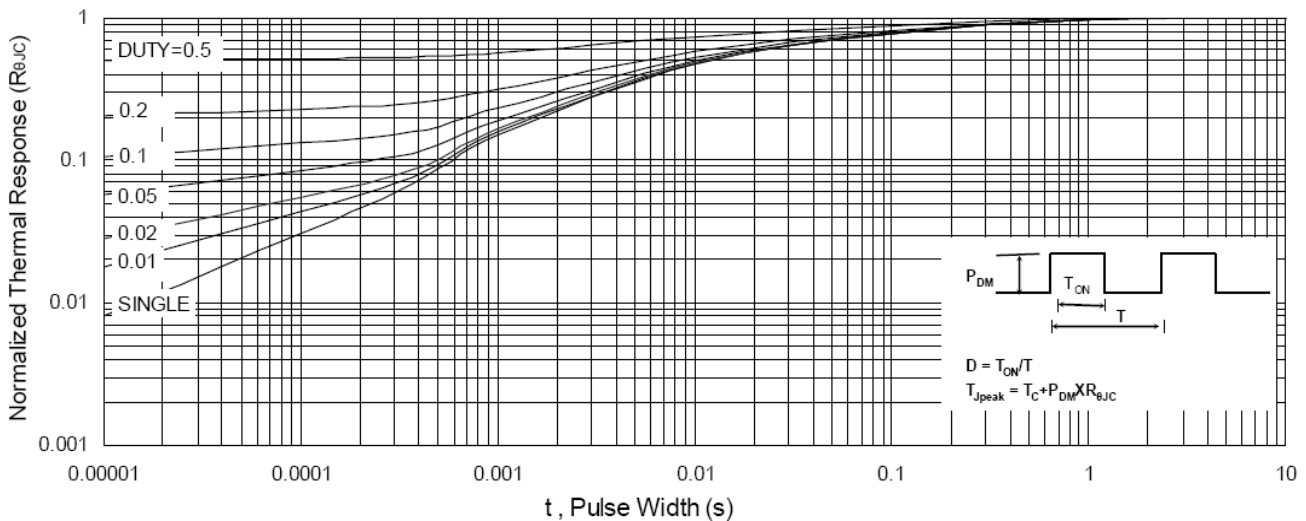


Fig. 9 Effective Transient Thermal Impedance

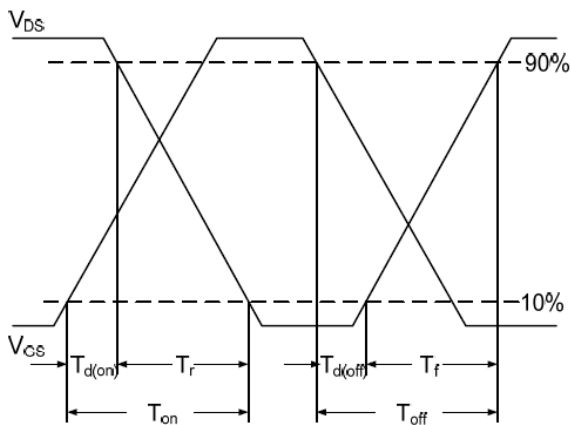


Fig. 10 Switching Time Waveform

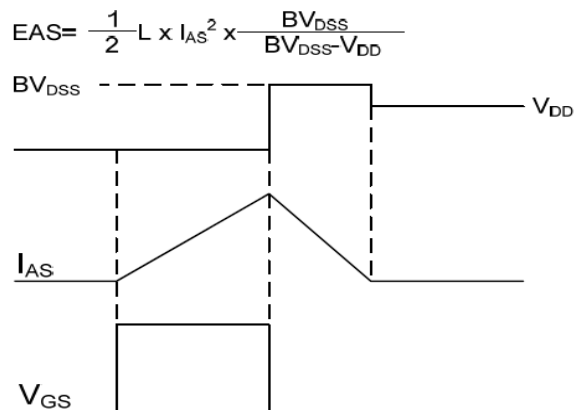


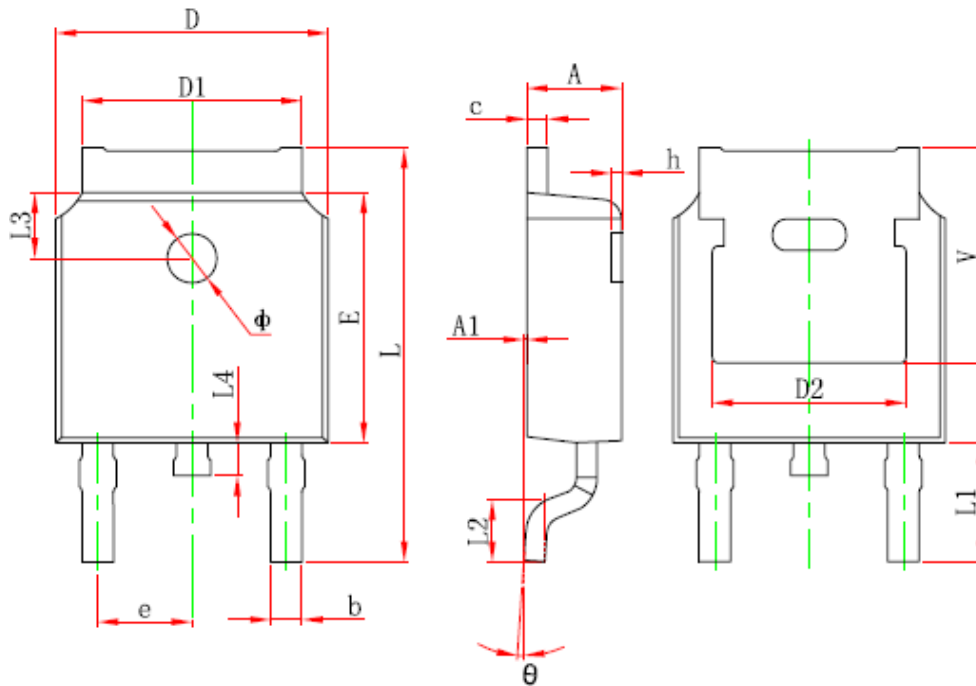
Fig. 11 Unclamped Inductive Waveform



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### TO-252 PACKAGE OUTLINE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
v	5.350 REF.		0.211 REF.	



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