



# 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.

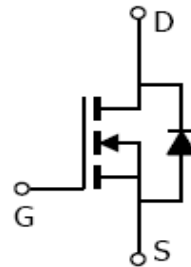
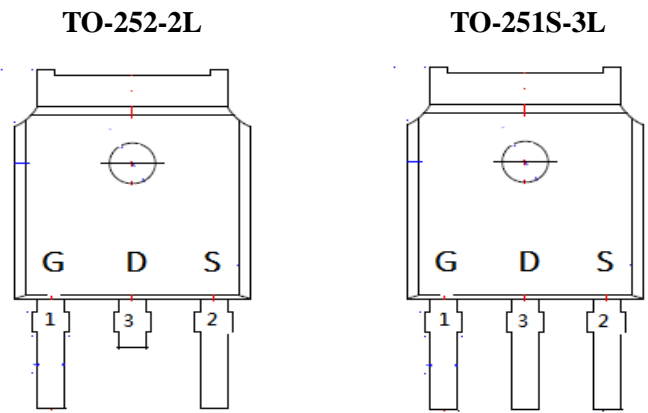
### FEATURES

- ◆ 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/TO-251 package design

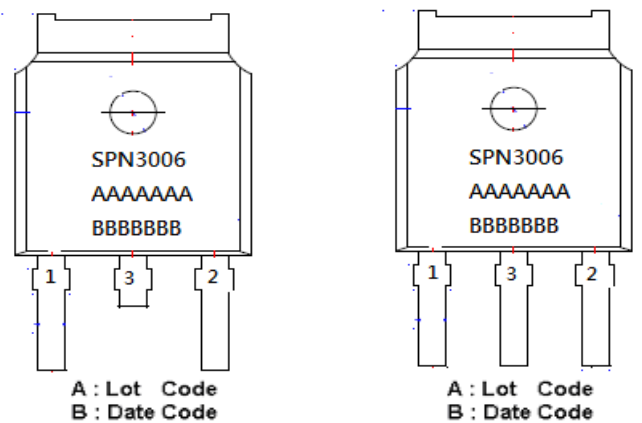
### APPLICATIONS

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

### PIN CONFIGURATION



### 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
SPN3006ST251TGB	TO-251S-3L	SPN3006
SPN3006T252RGB	TO-252-2L	SPN3006

※ SPN3006T252RGB : Tape Reel ; Pb – Free ; Halogen - Free

※ SPN3006ST251TGB: 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>	30	V	
Gate –Source Voltage	V <sub>GSS</sub>	±20	V	
Continuous Drain Current	I <sub>D</sub>	TA=25°C	80	A
		TA=100°C	57	
Pulsed Drain Current	I <sub>DM</sub>	160	A	
Avalanche Current	I <sub>AS</sub>	48	A	
Single Pulse Avalanche Energy	E <sub>AS</sub>	259	mJ	
Power Dissipation	P <sub>D</sub>	6	W	
Operating Junction Temperature	T <sub>J</sub>	150	°C	
Storage Temperature Range	T <sub>STG</sub>	-55/150	°C	
Thermal Resistance-Junction to Ambient (t ≤ 10s)	R <sub>θJA</sub>	25	°C/W	



# SPN3006

## N-Channel Enhancement Mode MOSFET

### ELECTRICAL CHARACTERISTICS

(T<sub>A</sub>=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0		2.5	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V			1	μA
		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C			5	
On-State Drain Current	I <sub>D(on)</sub>	V <sub>DS</sub> ≥5V, V <sub>GS</sub> =10V			80	A
Drain-Source On-Resistance	R <sub>DSON</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A		4.7	5.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A		7.5	9	
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =30A		22		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =1A, V <sub>GS</sub> =0V			1	V
Single Pulse Avalanche Energy	E <sub>AS</sub>	V <sub>DD</sub> =25V, L=0.1mH, I <sub>AS</sub> =24A	60			mJ
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V I <sub>D</sub> =15A		20	18	nC
Gate-Source Charge	Q <sub>gs</sub>			7.6		
Gate-Drain Charge	Q <sub>gd</sub>			7.2		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V f=1MHz		2300		pF
Output Capacitance	C <sub>oss</sub>			265		
Reverse Transfer Capacitance	C <sub>rss</sub>			210		
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> =15V, I <sub>D</sub> =15A, V <sub>GEN</sub> =10V R <sub>G</sub> =3.3Ω		7.8	15	nS
	t <sub>r</sub>			15	12	
Turn-Off Time	t <sub>d(off)</sub>			37	30	
	t <sub>f</sub>			10.6	15	



# SPN3006 N-Channel Enhancement Mode MOSFET

## TYPICAL CHARACTERISTICS

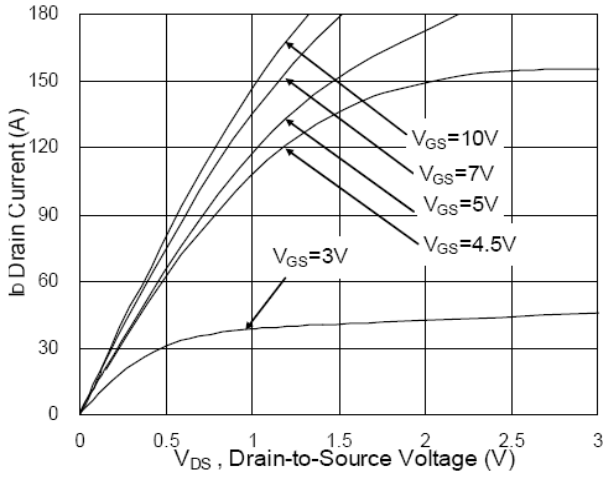


Fig. 1 Typical Output Characteristics

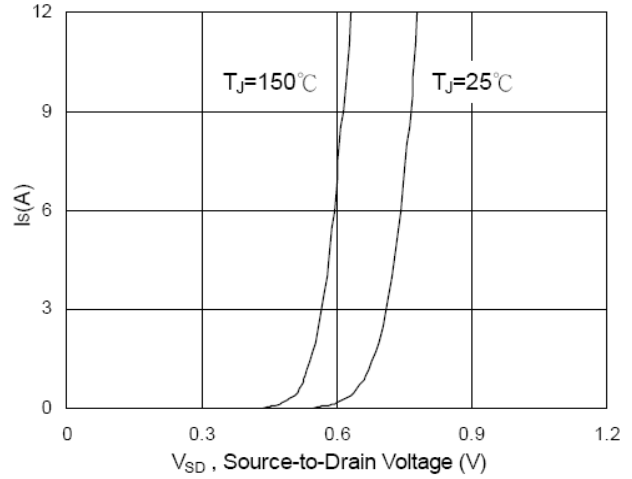


Fig. 2 Transfer Characteristics

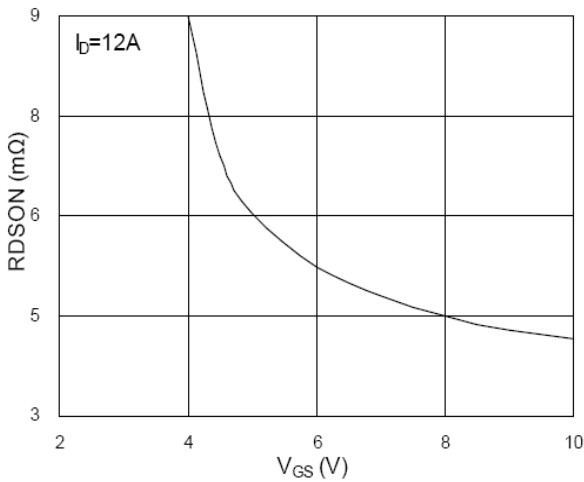


Fig. 3 On-Resistance vs Gate voltage

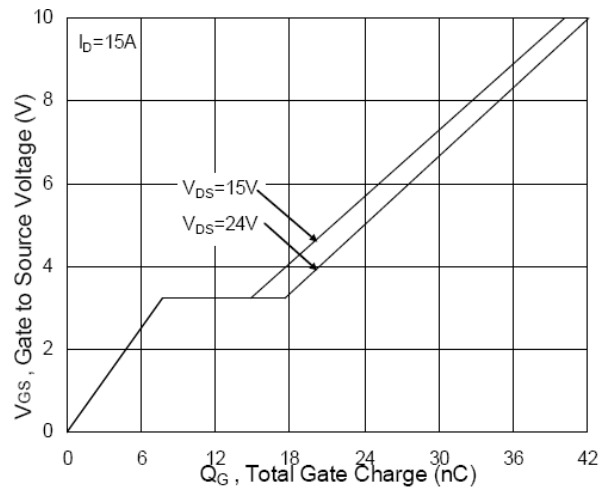


Fig. 4 Gate Charge Characteristics

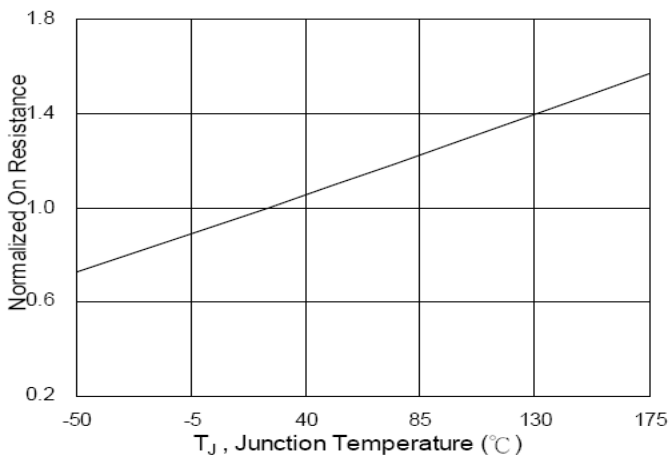


Fig. 5 On-Resistance vs Junction Temp

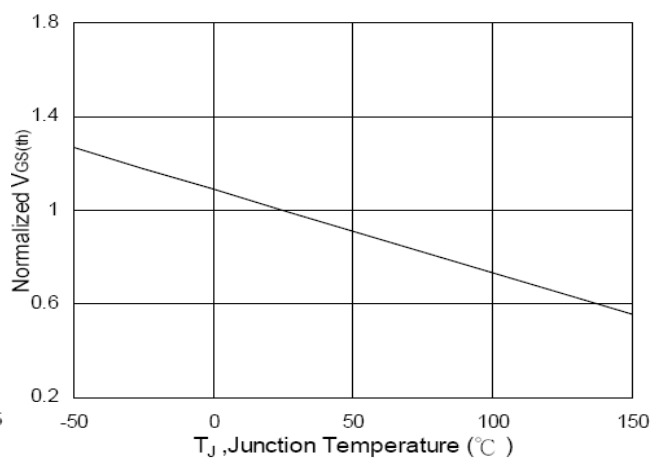


Fig. 6 Vgs vs Junction Temperature



# SPN3006 N-Channel Enhancement Mode MOSFET

## TYPICAL CHARACTERISTICS

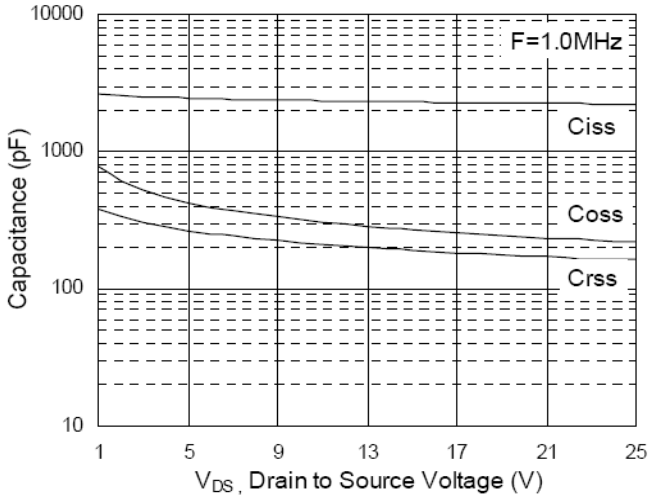


Fig. 7 Typical Capacitance Characteristics

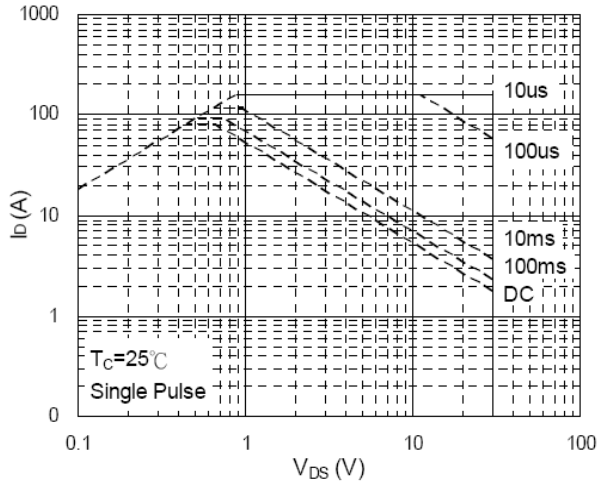


Fig. 8 Maximum Safe Operation Area

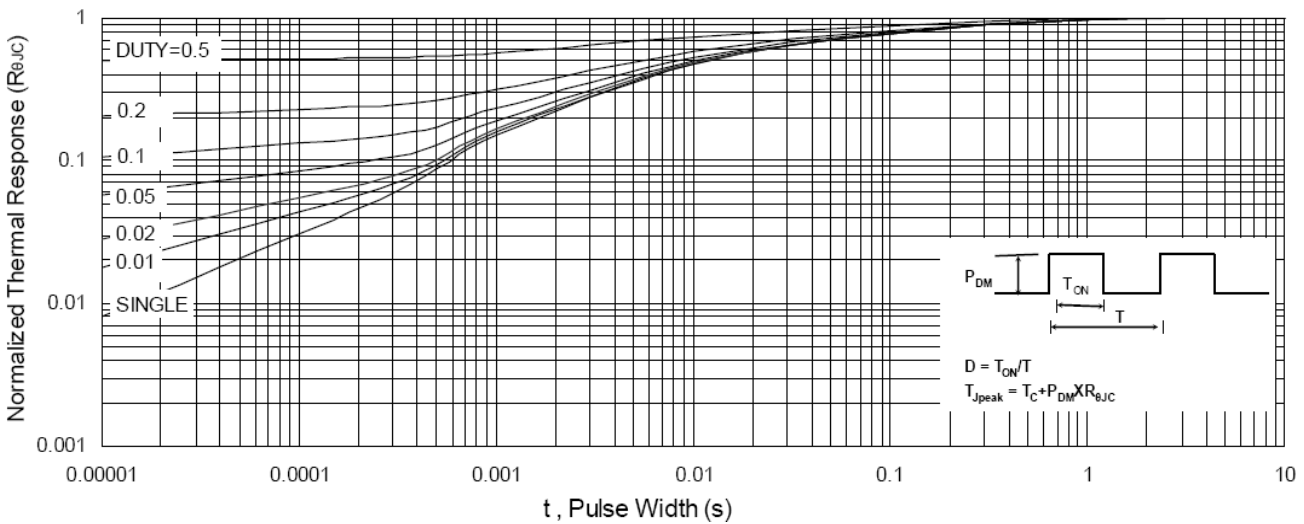


Fig. 9 Effective Transient Thermal Impedance

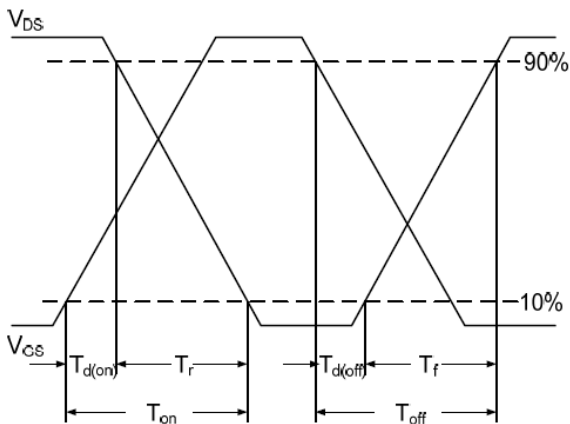


Fig. 10 Switching Time Waveform

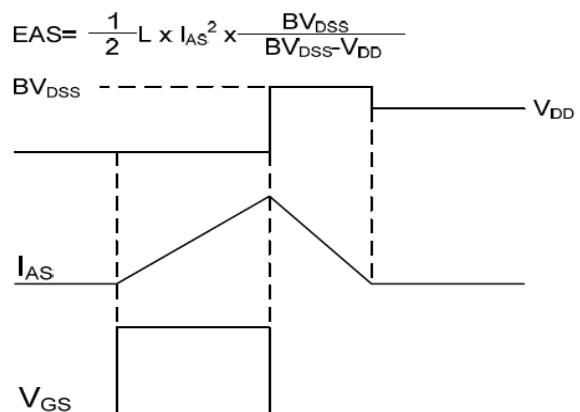
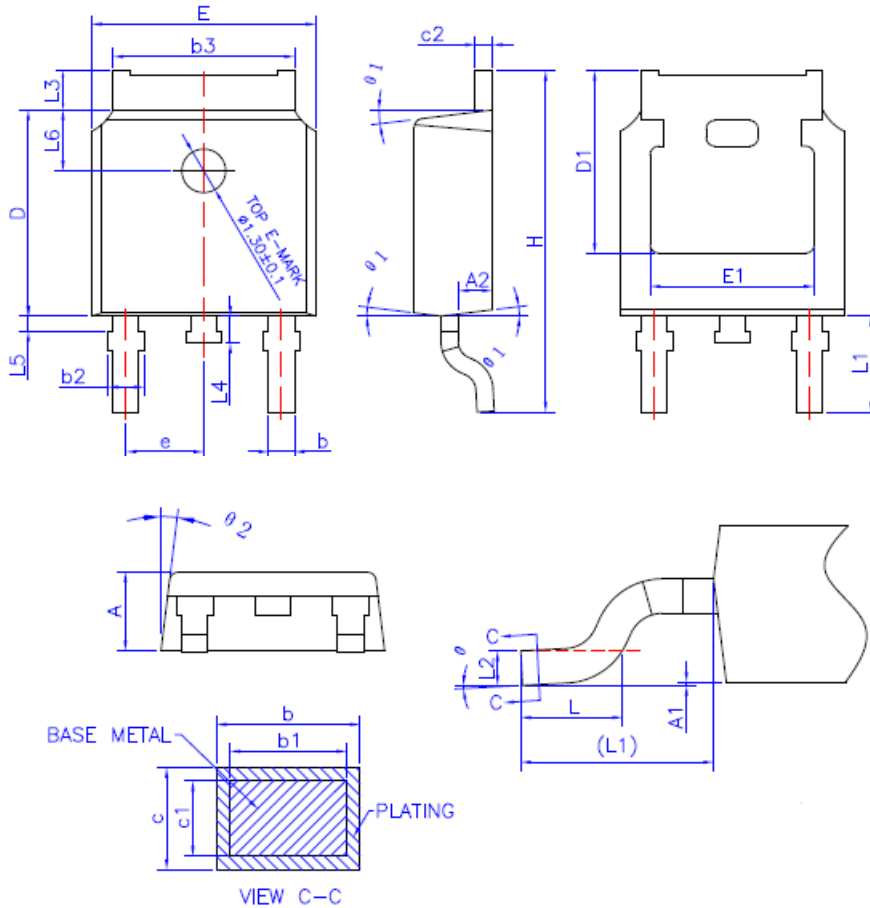


Fig. 11 Unclamped Inductive Waveform



# SPN3006 N-Channel Enhancement Mode MOSFET

## TO-252-2L PACKAGE OUTLINE



COMMON DIMENSIONS  
(UNITS OF MEASURE =MILLIMETER)

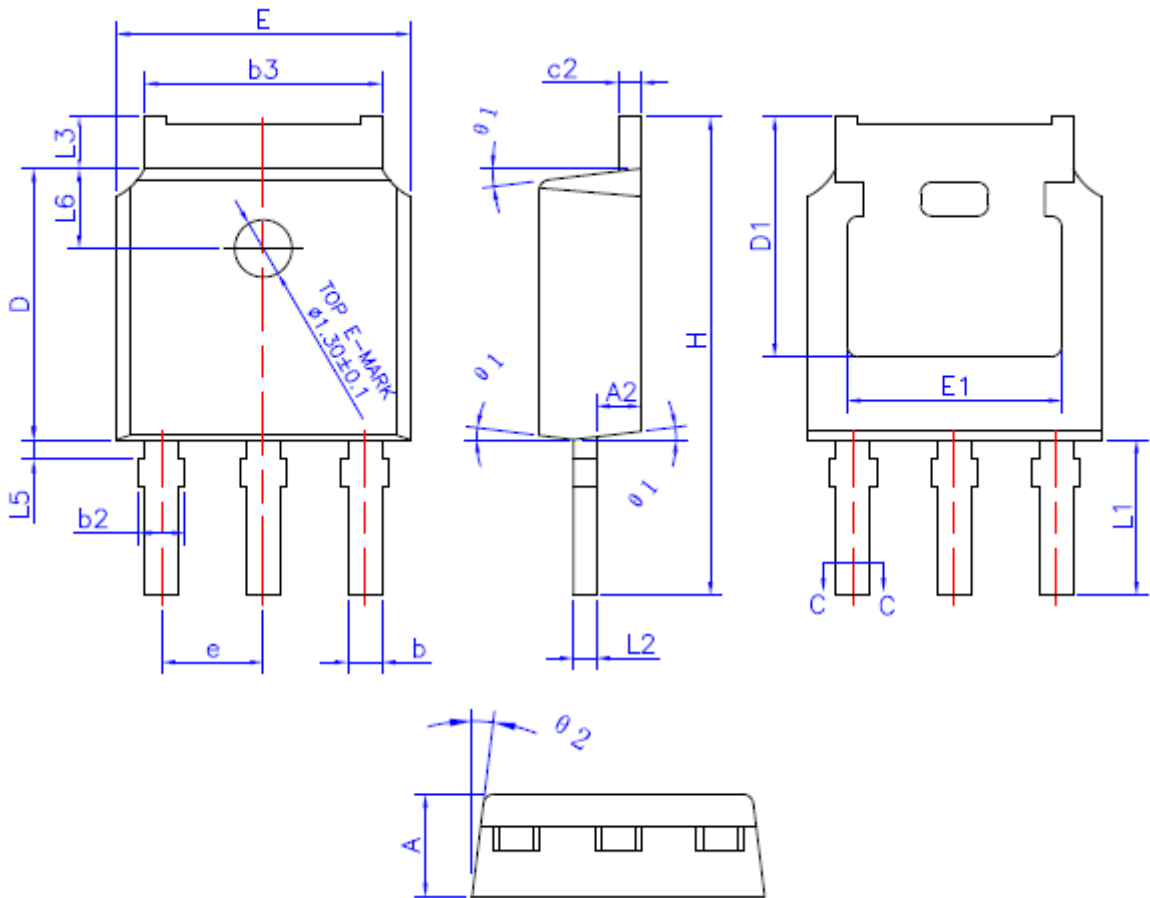
SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0	—	0.10
A2	0.90	1.01	1.10
b	0.72	—	0.85
b1	0.71	0.76	0.81
b2	0.72	—	0.90
b3	5.13	5.33	5.46
c	0.47	—	0.60
c1	0.46	0.51	0.56
c2	0.47	—	0.60
D	6.00	6.10	6.20
D1	5.25	—	—
E	6.50	6.60	6.70
E1	4.70	—	—
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90 REF		
L2	0.508 BSC		
L3	0.90	—	1.25
L4	0.60	0.80	1.00
L5	0.15	—	0.75
L6	1.80 REF		
$\theta$	0°	—	8°
$\theta_1$	5°	7°	9°
$\theta_2$	5°	7°	9°

NOTES:  
ALL DIMENSIONS REFER TO JEDEC STANDARD  
TO-252 AA DO NOT INCLUDE MOLD FLASH OR  
PROTRUSIONS



# SPN3006 N-Channel Enhancement Mode MOSFET

## TO-251S-3L PACKAGE OUTLINE



COMMON DIMENSIONS  
(UNITS OF MEASURE =MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A2	0.90	1.01	1.10
b	0.72	—	0.85
b1	0.71	0.76	0.81
b2	0.72	—	0.90
b3	5.13	5.33	5.46
c	0.47	—	0.60
c1	0.46	0.51	0.56
c2	0.47	—	0.60
D	6.00	6.10	6.20
D1	5.25	—	—
E	6.50	6.60	6.70
E1	4.70	—	—
e	2.186	2.286	2.386
H	10.40	10.70	11.00
L1	3.50 REF		
L2	0.508 BSC		
L3	0.90	—	1.25
L5	0.15	—	0.75
L6	1.80 REF		
$\theta_1$	5°	7°	9°
$\theta_2$	5°	7°	9°



# SPN3006

## N-Channel Enhancement Mode MOSFET

---

Information provided is alleged to be exact and consistent. SYNC Power Corporation presumes no responsibility for the penalties of use of such information or for any violation of patents or other rights of third parties which may result from its use. No license is granted by allegation or otherwise under any patent or patent rights of SYNC Power Corporation. Conditions mentioned in this publication are subject to change without notice. This publication surpasses and replaces all information previously supplied. SYNC Power Corporation products are not authorized for use as critical components in life support devices or systems without express written approval of SYNC Power Corporation.

© The SYNC Power logo is a registered trademark of SYNC Power Corporation

© 2017 SYNC Power Corporation – Printed in Taiwan – All Rights Reserved

SYNC Power Corporation

7F-2, No.3-1, Park Street

NanKang District (NKSP), Taipei, Taiwan 115

Phone: 886-2-2655-8178

Fax: 886-2-2655-8468

© <http://www.syncpower.com>