



# SPN100T12

## N-Channel Enhancement Mode MOSFET

### DESCRIPTION

The SPN100T12 is the N-Channel enhancement mode power field effect transistor which is produced using high cell density DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suitable for synchronous rectifier application, Motor control power management and other Power Tool circuits. It has been optimized for low gate charge, low  $R_{DS(ON)}$  and fast switching speed.

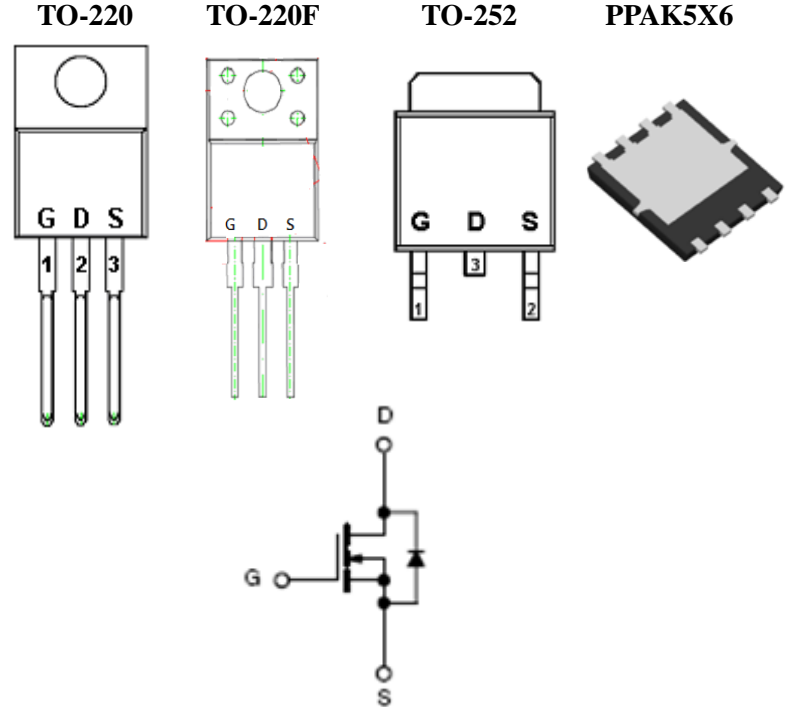
### APPLICATIONS

- DC/DC Converter
- Load Switch
- SMPS Secondary Side Synchronous Rectifier
- Power Tool
- Motor Control

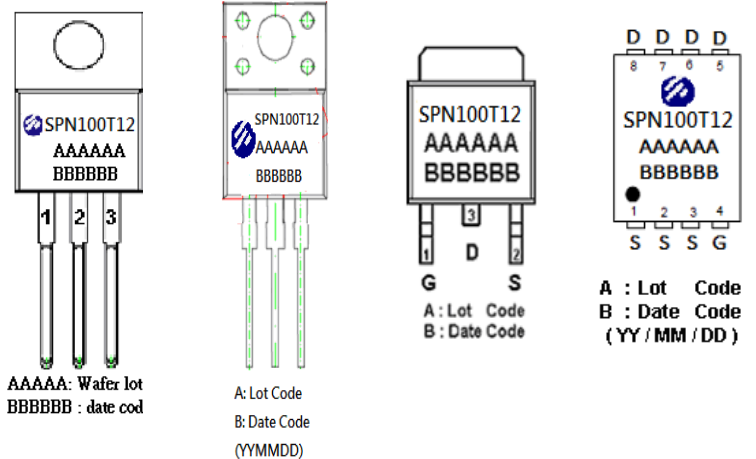
### FEATURES

- ◆ 120V/20A,  $R_{DS(ON)}=10m\Omega@V_{GS}=10V$
- ◆ Super high density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-220-3L/TO-220F/TO-252/PPAK5X6 package design

### PIN CONFIGURATION



### PART MARKING





# SPN100T12

## N-Channel Enhancement Mode MOSFET

### TO-220/TO-220F PIN DESCRIPTION

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

### TO-252 PIN DESCRIPTION

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

### PPAK5X6 PIN DESCRIPTION

Pin	Symbol	Description
1	S	Source
2	S	Source
3	S	Source
4	G	Gate
5	D	Drain
6	D	Drain
7	D	Drain
8	D	Drain

### ORDERING INFORMATION

Part Number	Package	Part Marking
SPN100T12T220TGB	TO-220-3L	SPN100T12
SPN100T12T220FTGB	TO-220F-3L	SPN100T12
SPN100T12T252RGB	TO-252-2L	SPN100T12
SPN100T12DN8RGB	PPAK5X6	SPN100T12

- ※ SPN100T12T220TGB : Tube ; Pb – Free ; Halogen – Free
- ※ SPN100T12T220FTGB : Tube ; Pb – Free ; Halogen - Free
- ※ SPN100T12T252RGB : Tape Reel ; Pb – Free ; Halogen – Free
- ※ SPN100T12DN8RGB : Tape Reel ; Pb – Free ; Halogen – Free



# SPN100T12

## N-Channel Enhancement Mode MOSFET

### ABSOLUTE MAXIMUM RATINGS

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

Parameter	Symbol	Typical	Unit	
Drain-Source Voltage	V <sub>DSS</sub>	120	V	
Gate –Source Voltage	V <sub>GSS</sub>	±20	V	
Continuous Drain Current (Silicon Limited)	I <sub>D</sub>	T <sub>C</sub> =25°C	100	A
		T <sub>C</sub> =70°C	72	
Pulsed Drain Current	I <sub>DM</sub>	200	A	
Power Dissipation@ T <sub>C</sub> =25°C (TO-220)	P <sub>D</sub>	150	W	
Power Dissipation@ T <sub>C</sub> =25°C (TO-251/TO-252)		125		
Power Dissipation@ T <sub>C</sub> =25°C (PPAK5X6)		114		
Avalanche Energy with Single Pulse	E <sub>AS</sub>	320	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 (TO-220)	R <sub>θJA</sub>	62.5	°C/W	
Thermal Resistance-Junction to Ambient (TO-251/TO-252)	R <sub>θJA</sub>	100	°C/W	
Thermal Resistance-Junction to Ambient (PPAK5X6)	R <sub>θJA</sub>	55	°C/W	



# SPN100T12

## N-Channel Enhancement Mode MOSFET

### ELECTRICAL CHARACTERISTICS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	120			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	
Gate Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=120V, V_{GS}=0V$ $T_J = 25^\circ C$			1	uA
		$V_{DS}=120V, V_{GS}=0V$ $T_J = 100^\circ C$			100	
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		7.8	10	m $\Omega$
Diode Forward Voltage	$V_{SD}$	$I_F=20A, V_{GS}=0V$		0.9	1.2	V
Transconductance	$g_{ts}$	$V_{DS}=5V, I_D=20A$		65		S
Gate Resistance	$R_G$	$V_{GS}=0V, V_{DS}Open,$ $f=1MHz$		3.5		$\Omega$
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS}=60V, V_{GS}=10V$ $I_D=20A$		56		nC
Gate-Source Charge	$Q_{gs}$			18		
Gate-Drain Charge	$Q_{gd}$			6		
Input Capacitance	$C_{iss}$	$V_{DD}=60V, V_{GS}=0V$ $f=1MHz$		4470		pF
Output Capacitance	$C_{oss}$			235		
Reverse Transfer Capacitance	$C_{rss}$			9.5		
Turn-On Time	$t_{d(on)}$	$V_{DD}=60V,$ $I_D=20A, V_{GS}=10V$ $R_G=10\Omega$		16		nS
	$t_r$			21		
Turn-Off Time	$t_{d(off)}$			38		
	$t_f$			19		



# SPN100T12

## N-Channel Enhancement Mode MOSFET

### TYPICAL CHARACTERISTICS

Fig 1. Typical Output Characteristics

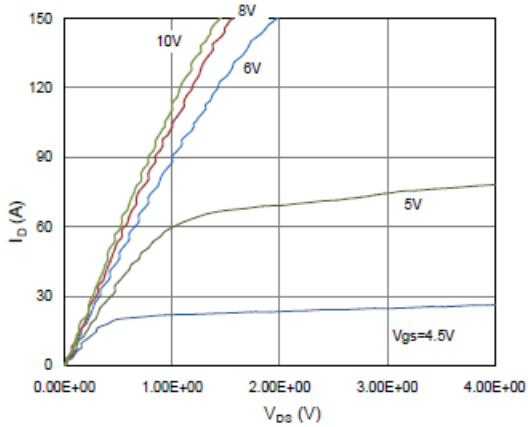


Figure 2. On-Resistance vs. Gate-Source Voltage

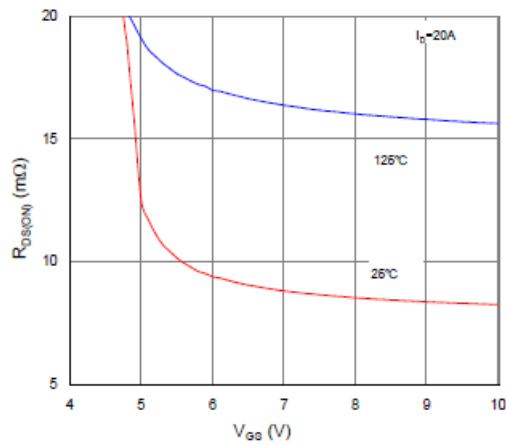


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

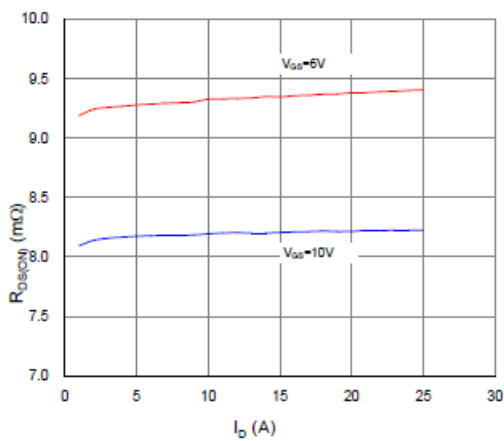


Figure 4. Normalized On-Resistance vs. Junction Temperature

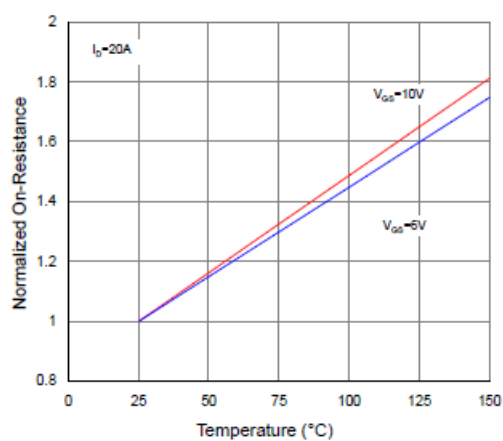


Figure 5. Typical Transfer Characteristics

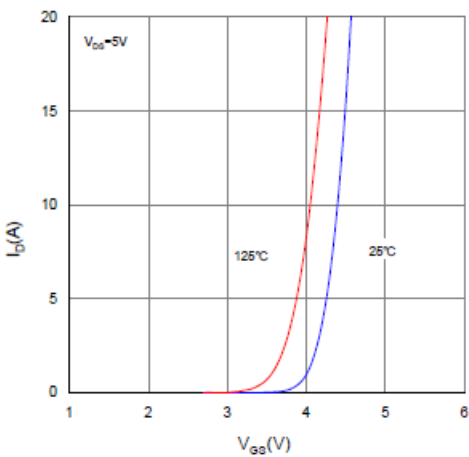
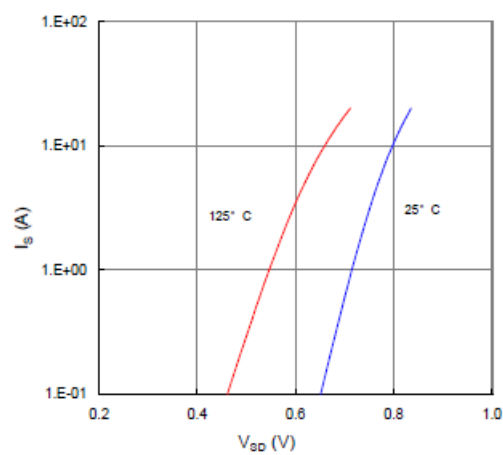


Figure 6. Typical Source-Drain Diode Forward Voltage





# SPN100T12

## N-Channel Enhancement Mode MOSFET

### TYPICAL CHARACTERISTICS

Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

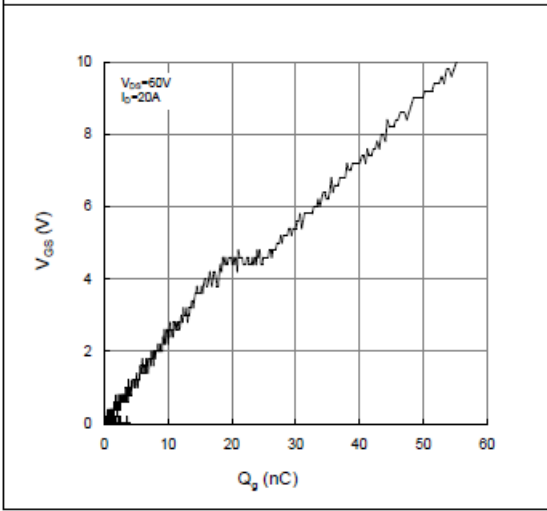


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

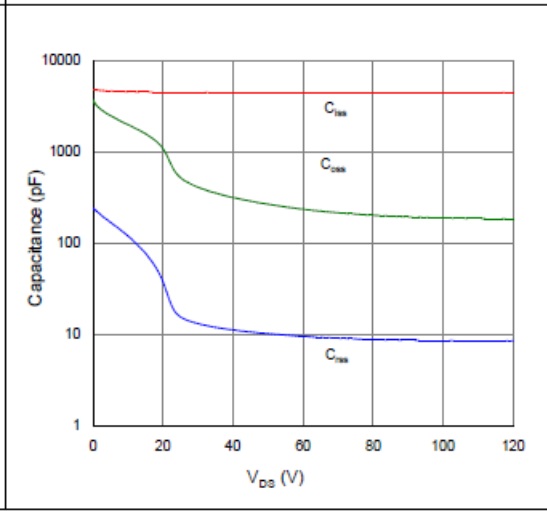


Figure 9. Maximum Safe Operating Area

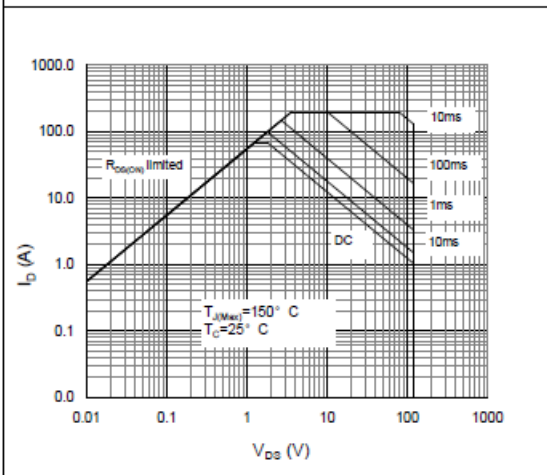


Figure 10. Maximum Drain Current vs. Case Temperature

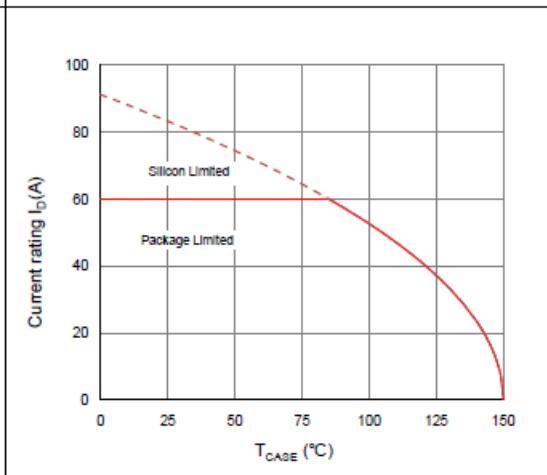
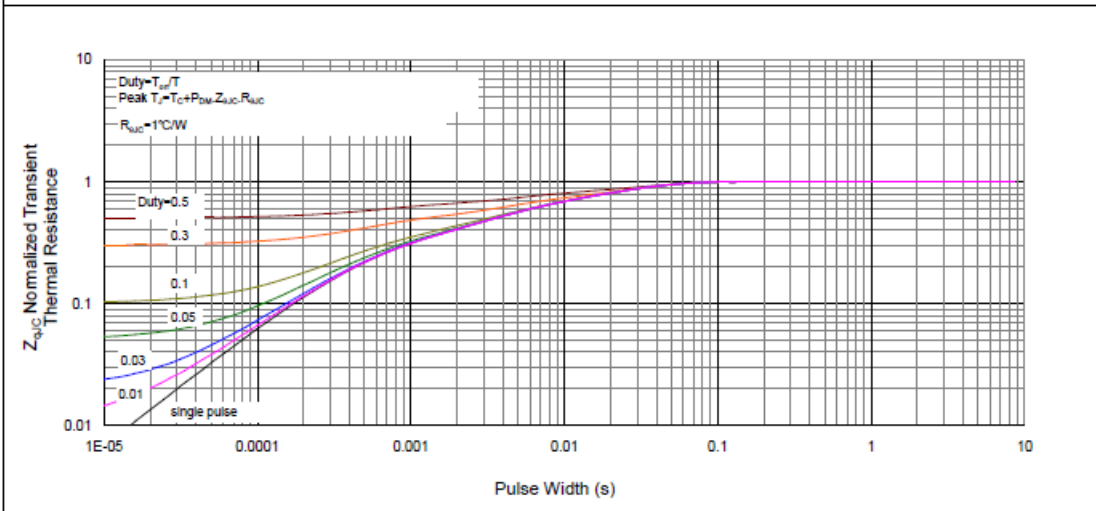


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case

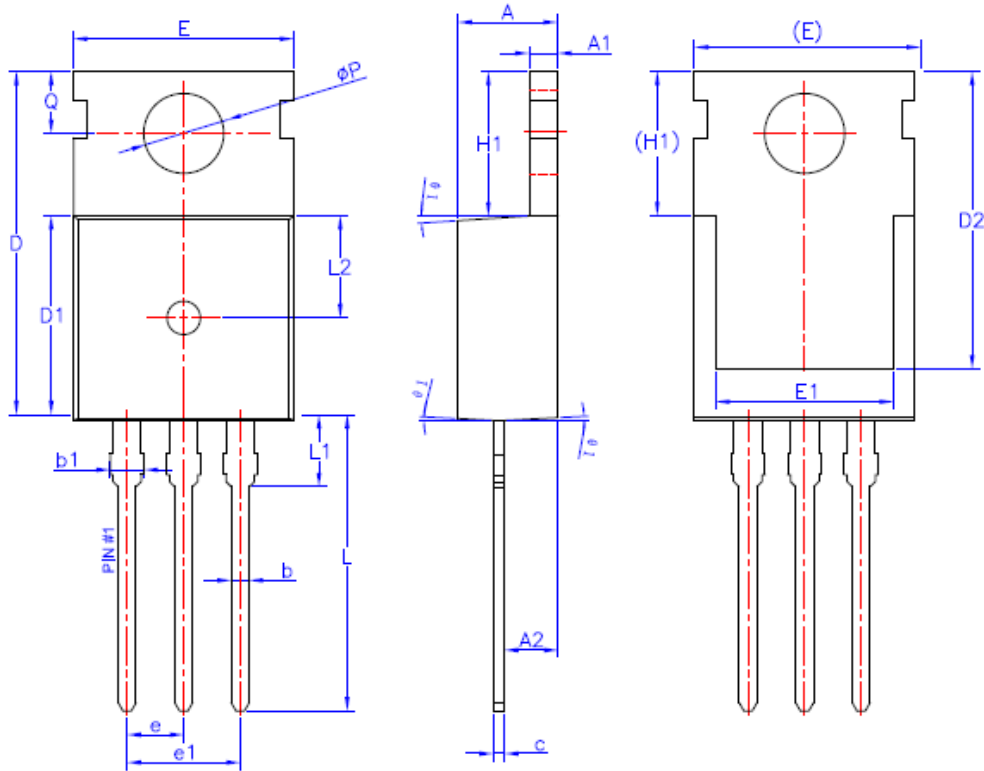




# SPN100T12

## N-Channel Enhancement Mode MOSFET

### TO-220 PACKAGE OUTLINE



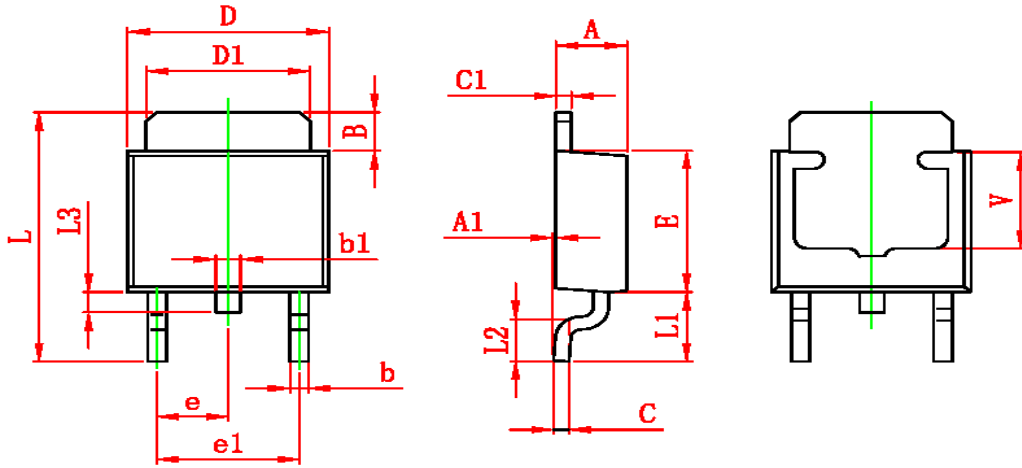
SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	—	0.90
b1	1.42	—	1.57
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	—	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.54BSC		
e1	5.08BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	—	—	3.50
L2	4.60REF		
∅P	3.55	3.60	3.65
Q	2.73	—	2.87
∅1	1°	3°	5°



# SPN100T12

## N-Channel Enhancement Mode MOSFET

### 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	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP		0.091 TYP	
e1	4.500	4.700	0.177	0.185
L	9.500	9.900	0.374	0.390
L1	2.550	2.900	0.100	0.114
L2	1.400	1.780	0.055	0.070
L3	0.350	0.650	0.014	0.026
V	3.80 REF		0.150 REF	

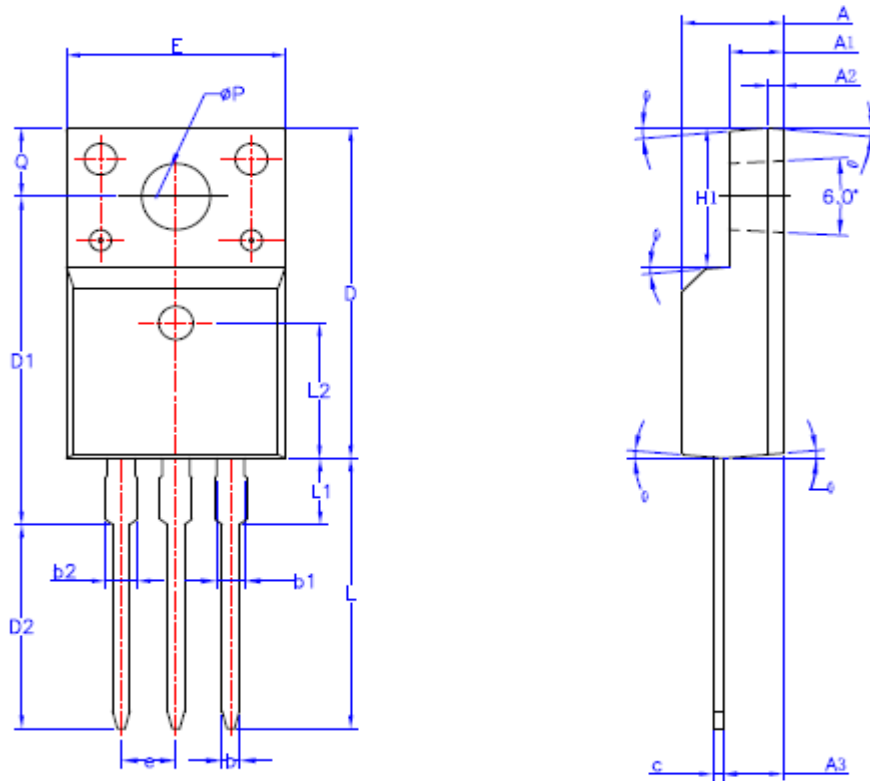




# SPN100T12

## N-Channel Enhancement Mode MOSFET

### TO-220F PACKAGE OUTLINE



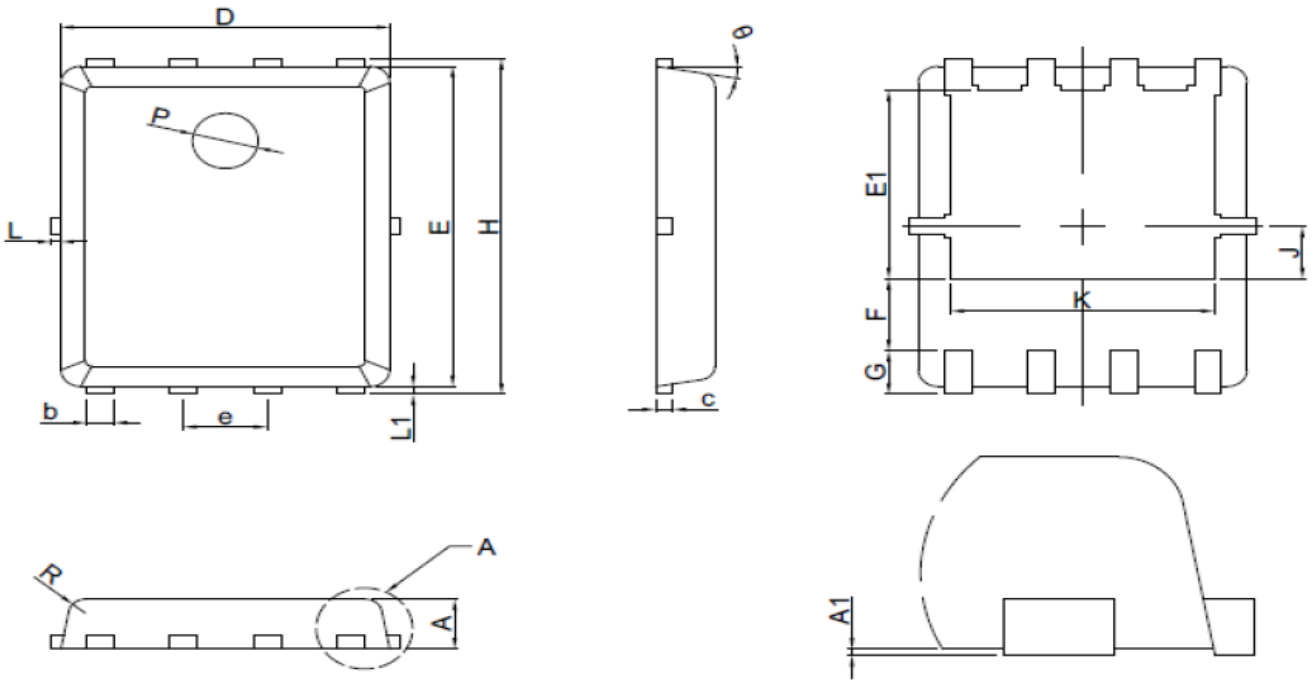
SYMBOL	MIN	NOM	MAX
A	4.50	4.70	4.83
A1	2.34	2.54	2.74
A2	0.70 REF		
A3	2.56	2.76	2.93
b	0.70	—	0.90
b1	1.18	—	1.38
b2	—	—	1.47
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
D2	9.60	9.80	10.0
E	9.96	10.16	10.36
e	2.54BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	—	—	3.50
L2	6.50REF		
∅P	3.08	3.18	3.28
Q	3.20	—	3.40
θ 1	1°	3°	5°



# SPN100T12

## N-Channel Enhancement Mode MOSFET

### PPAK5X6 PACKAGE OUTLINE



SYMBOL	MILLIMETERS		
	MIN	NOM	MAX
A	0.8	0.95	1.1
A1	0.00	0.03	0.05
b	0.33	0.41	0.51
c	0.254 REF		
D	4.80	4.95	5.10
F	1.40 REF		
E	5.70	5.80	5.90
e	1.27 BSC		
H	5.90	6.05	6.20
L1	0.06	0.13	0.20
G	0.60 REF		
J	0.95 BSC		
K	4.00 REF		
L	---	----	0.20
P	1.00 REF		
E1	3.40REF		
E2	0.95 REF		
$\theta$	6°	10°	14°
R	0.25REF		



# SPN100T12

## 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

© 2016 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>