



SPN90T12 N-Channel Enhancement Mode MOSFET

DESCRIPTION

The SPN90T12 is the N-Channel logic enhancement mode power field effect transistors are produced using high cell density, DMOS trench technology. The SPN90T12 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.

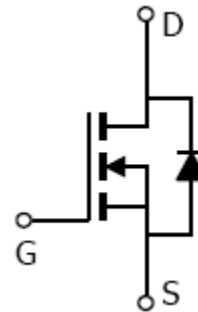
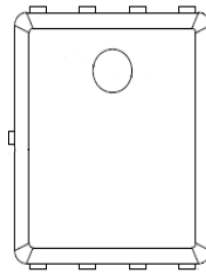
FEATURES

- ◆ 120V/90A, $R_{DS(ON)}=8.0\text{ m}\Omega@V_{GS}=10V$
- ◆ 120V/90A, $R_{DS(ON)}=11\text{ m}\Omega@V_{GS}=4.5V$
- ◆ Super high density cell design for extremely low $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ PPAK5x6-8L package design

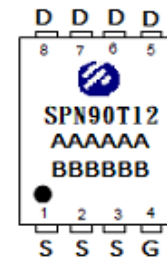
APPLICATIONS

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

PIN CONFIGURATION(PPAK5x6-8L)



PART MARKING



A : Lot Code
B : Date Code
(YY/MM/DD)



SPN90T12

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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
SPN90T12DN8RGB	PPAK5x6-8L	SPN90T12

※ SPN90T12DN8RGB : Tape Reel ; Pb – Free ; Halogen - Free

ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V _{DSS}	120	V
Gate –Source Voltage	V _{GSS}	±20	V
Continuous Drain Current (Silicon Limited)	I _D	T _C =25°C	90
		T _C =100°C	55
Pulsed Drain Current	I _{DM}	300	A
Single Pulse Avalanche Energy (T _C =25°C , L=0.4mH.)	E _{AS}	450	mJ
Power Dissipation	P _D	83	W
Operating Junction Temperature	T _J	-55/150	°C
Storage Temperature Range	T _{STG}	-55/150	°C
Thermal Resistance-Junction to Case	R _{θJC}	1.5	°C/W



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ELECTRICAL CHARACTERISTICS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	120			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.4	2.0	2.4	V
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=96V, V_{GS}=0V, T_J=25^\circ C,$			1	uA
		$V_{DS}=96V, V_{GS}=0V,$ $T_J=100^\circ C$			100	
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		6.8	8.0	mΩ
		$V_{GS}=4.5V, I_D=20A$		8.5	11	
Forward Transconductance	g_{fs}	$V_{DS}=5V, I_D=20A$		75		S
Gate resistance	R_g	$V_{DS}=0V, V_{GS}=0V$ $f=1MHz$		2.56		Ω
Diode Forward Voltage	V_{SD}	$I_S=20A, V_{GS}=0V$		0.9	1.2	V
Dynamic						
Total Gate Charge	$Q_g(10V)$	$V_{DS}=60V, V_{GS}=10V$ $I_D=20A$		48		nC
Total Gate Charge	$Q_g(4.5V)$			23		
Gate-Source Charge	Q_{gs}			11		
Gate-Drain Charge	Q_{gd}			9		
Input Capacitance	C_{iss}	$V_{DS}=60V, V_{GS}=0V$ $f=1MHz$		3515		pF
Output Capacitance	C_{oss}			385		
Reverse Transfer Capacitance	C_{rss}			11.5		
Turn-On Time	$t_{d(on)}$	$V_{DD}=60V,$ $I_D=20A, V_{GS}=10V$ $R_G=10\Omega$		15		nS
	t_r			8		
Turn-Off Time	$t_{d(off)}$			30		
	t_f			9		



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TYPICAL CHARACTERISTICS

Fig 1. Typical Output Characteristics

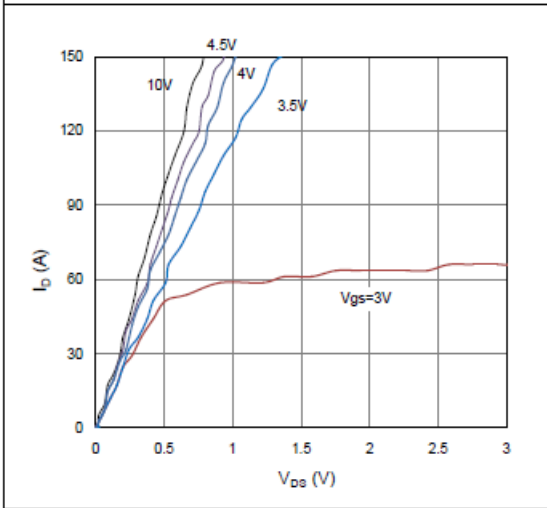


Figure 2. On-Resistance vs. Gate-Source Voltage

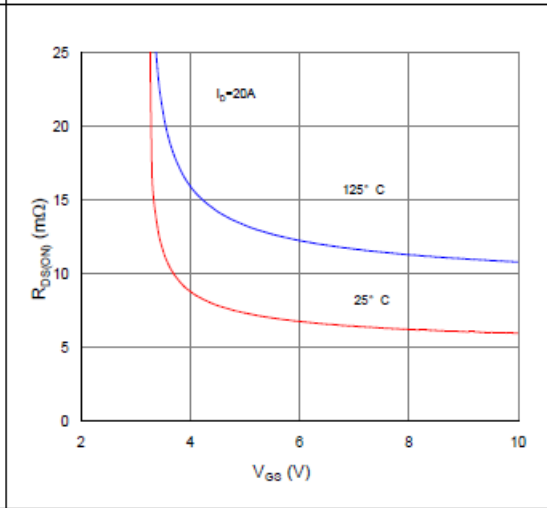


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

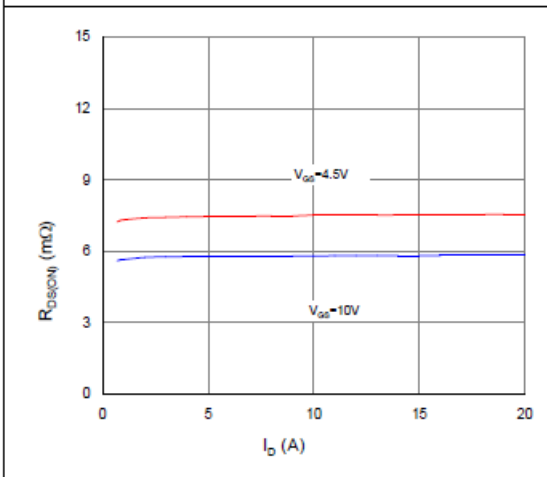


Figure 4. Normalized On-Resistance vs. Junction Temperature

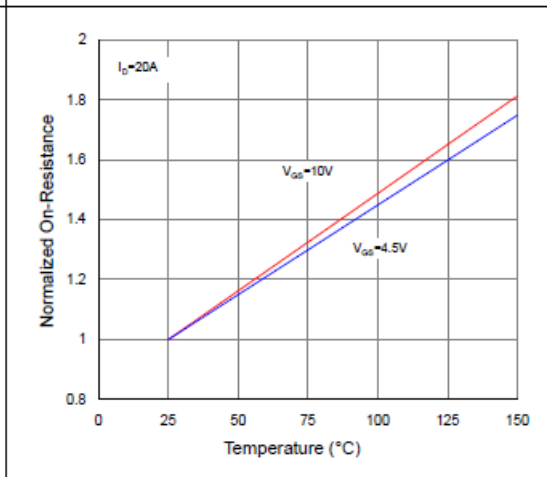


Figure 5. Typical Transfer Characteristics

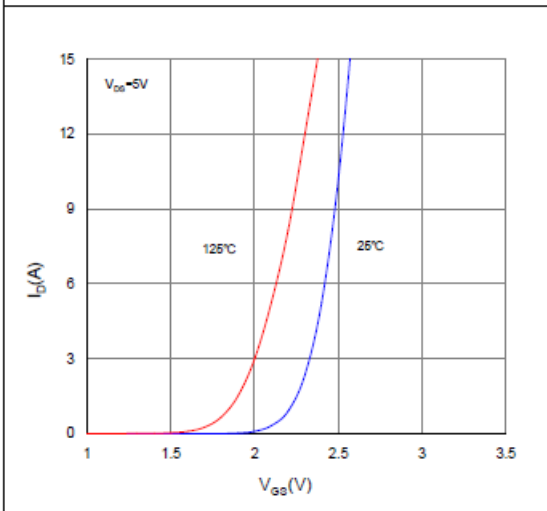
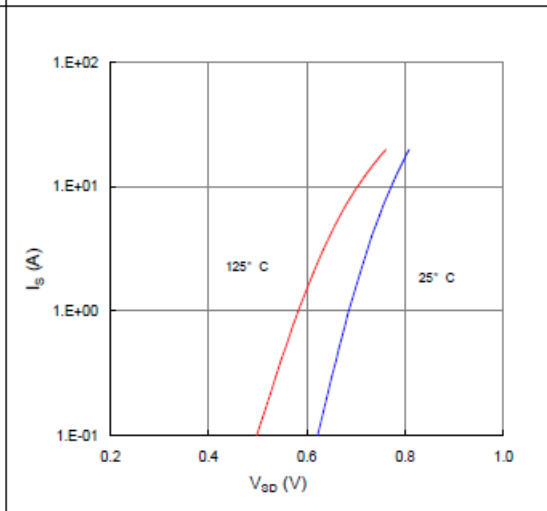


Figure 6. Typical Source-Drain Diode Forward Voltage





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TYPICAL CHARACTERISTICS

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

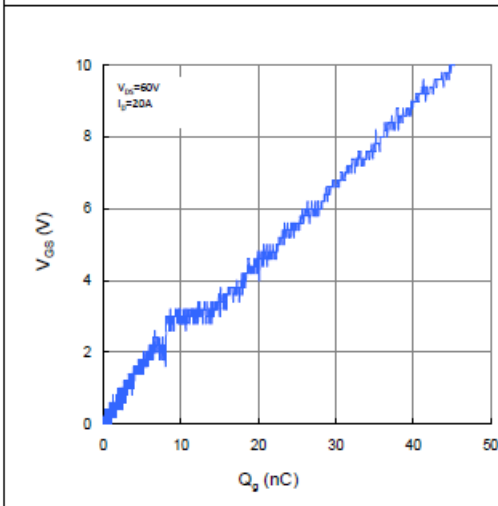


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

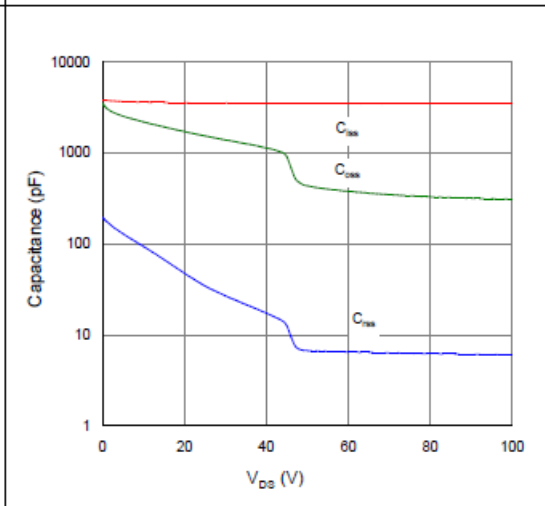


Figure 9. Maximum Safe Operating Area

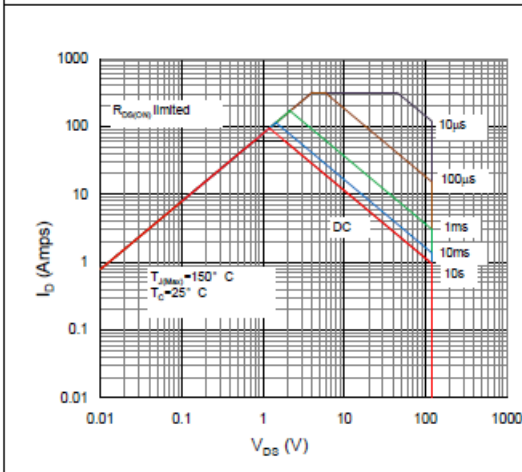


Figure 10. Maximum Drain Current vs. Case Temperature

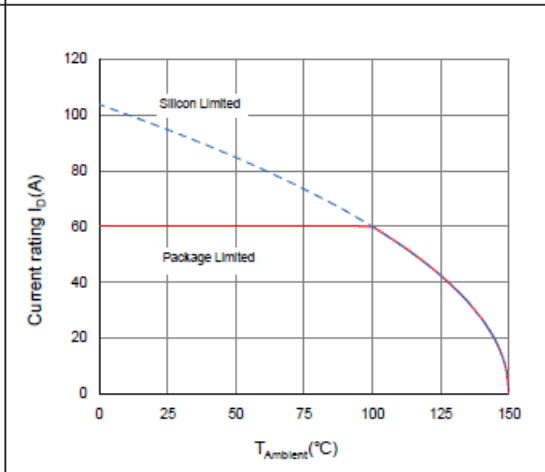
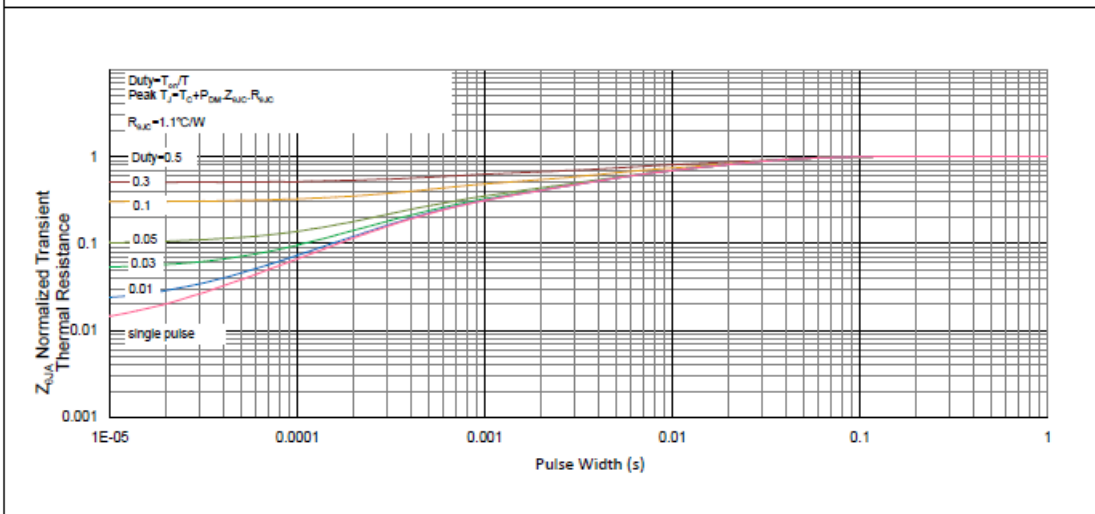


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient

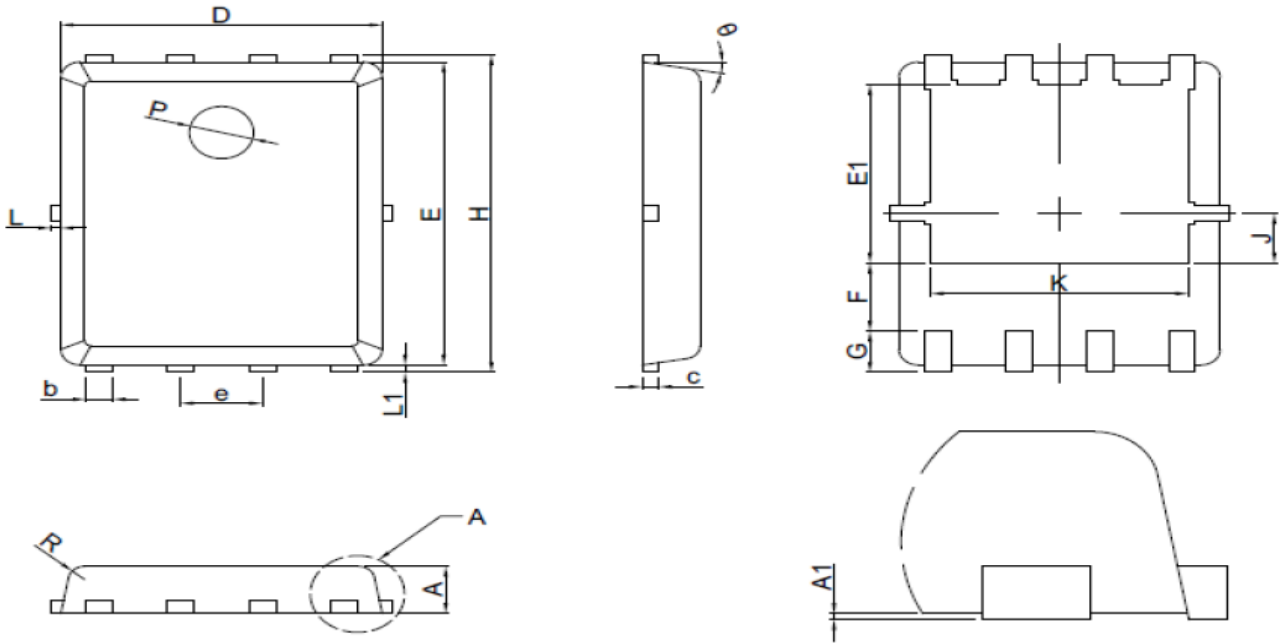




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PPAK5x6-8L PACKAGE OUTLINE



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		
θ	6°	10°	14°
R	0.25REF		



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