



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

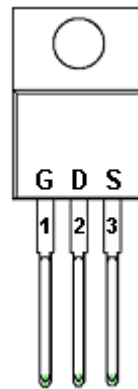
- DC/DC Converter
- Load Switch
- SMPS Secondary Side Synchronous Rectifier
- Power Tool
- Motor Control

FEATURES

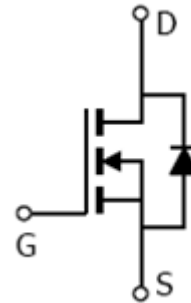
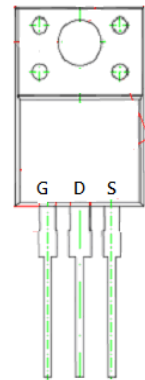
- ◆ 120V/100A , $R_{DS(ON)}=10m\Omega@V_{GS}=10V$
- ◆ Super high density cell design for extremely low $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-220-3L/TO-220F-3L package design

PIN CONFIGURATION

TO-220



TO-220F



AAAAA: Wafer lot no
BBBBBB : date code



A: Lot Code
B: Date Code
(YYMMDD)



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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
SPN100T12T220TGB	TO-220-3L	SPN100T12
SPN100T12T220FTGB	TO-220F-3L	SPN100T12

※ SPN100T12T220TGB : Tube ; Pb – Free ; Halogen – Free

※ SPN100T12T220FTGB : Tube ; 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	100	A
		T _C =70°C	72	
Pulsed Drain Current	I _{DM}	300	A	
Power Dissipation@ T _C =25°C (TO-220)	P _D	104	W	
Power Dissipation@ T _C =25°C (TO-220F)		93		
Avalanche Energy with Single Pulse (T _C =25°C, L = 0.1mH.)	E _{AS}	468	mJ	
Operating Junction Temperature	T _J	-55/150	°C	
Storage Temperature Range	T _{STG}	-55/150	°C	
Thermal Resistance-Junction to Ambient (TO-220/TO-220F)	R _{θJC}	1.2	°C/W	

Note :

The maximum current rating is package limited at 120A for TO-220-3L

The maximum current rating is package limited at 78A for TO-220F-3L



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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	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 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 Ω
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		Ω
Dynamic						
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		



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TYPICAL CHARACTERISTICS

Fig 1. Typical Output Characteristics

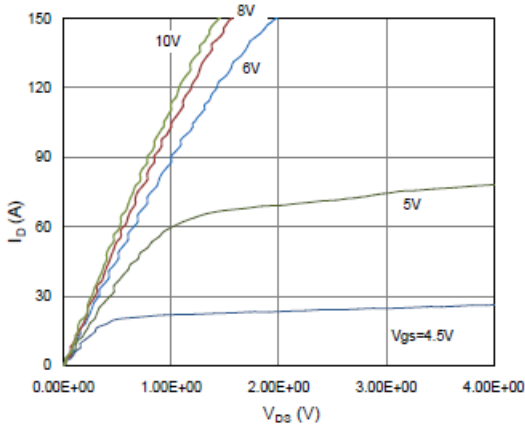


Figure 2. On-Resistance vs. Gate-Source Voltage

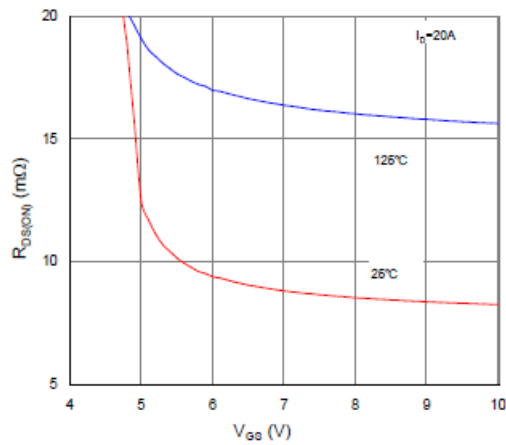


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

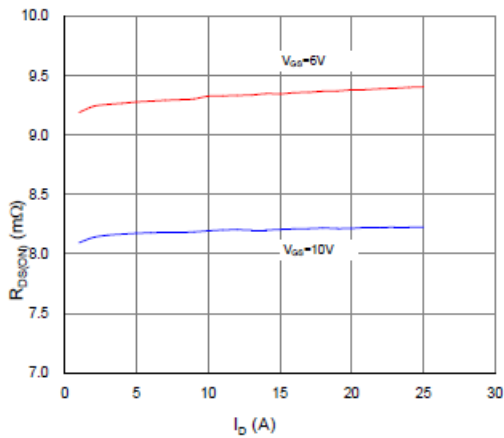


Figure 4. Normalized On-Resistance vs. Junction Temperature

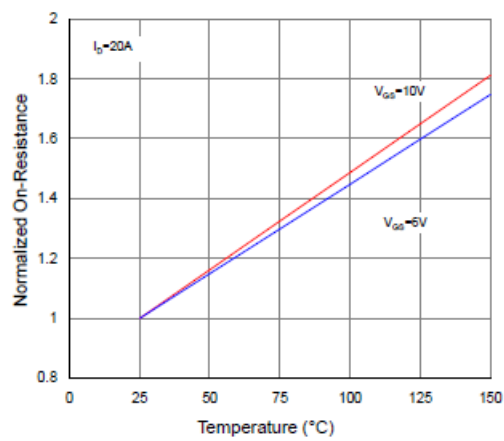


Figure 5. Typical Transfer Characteristics

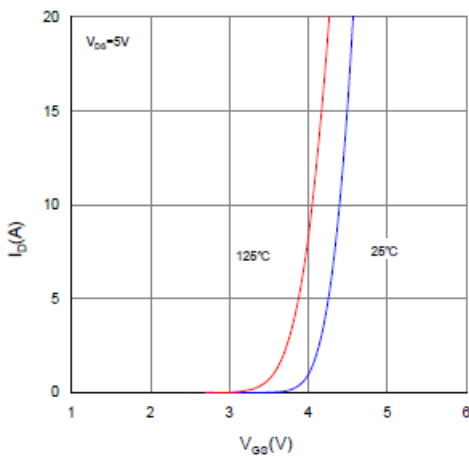
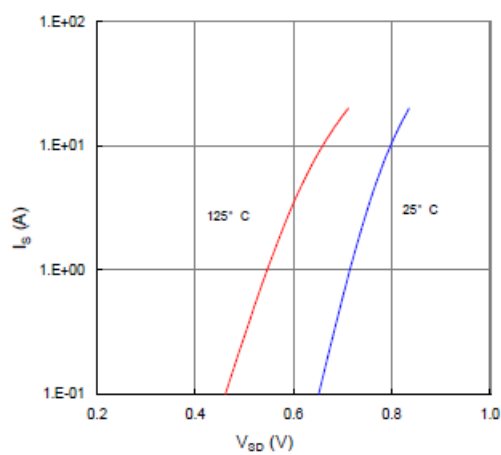


Figure 6. Typical Source-Drain Diode Forward Voltage





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TYPICAL CHARACTERISTICS

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

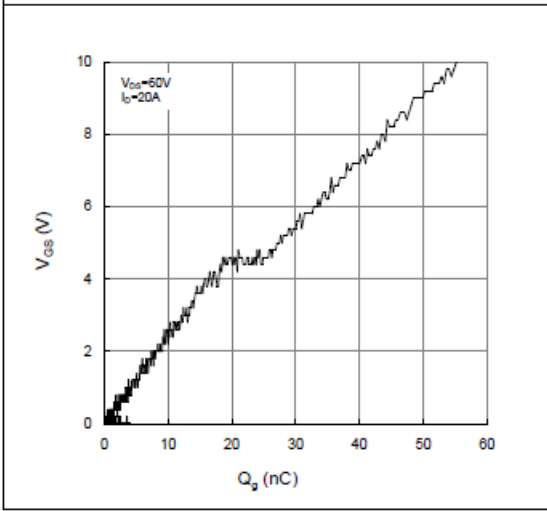


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

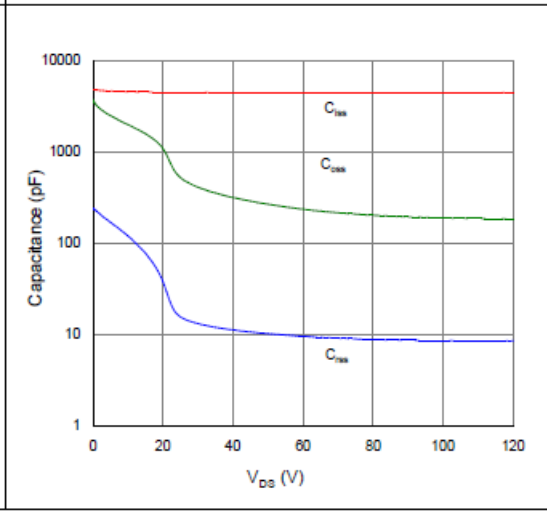


Figure 9. Maximum Safe Operating Area

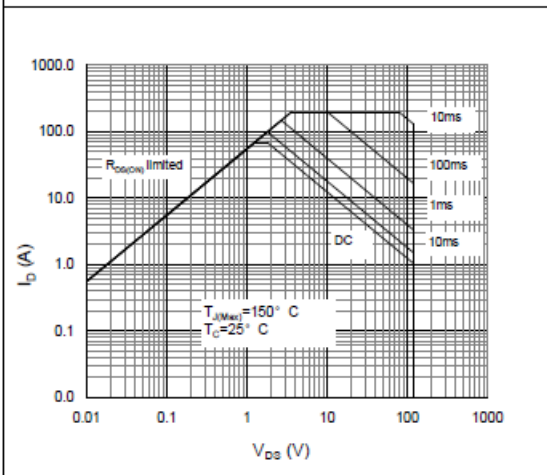


Figure 10. Maximum Drain Current vs. Case Temperature

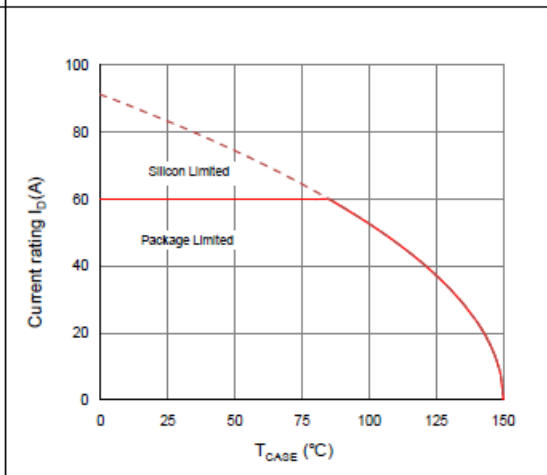
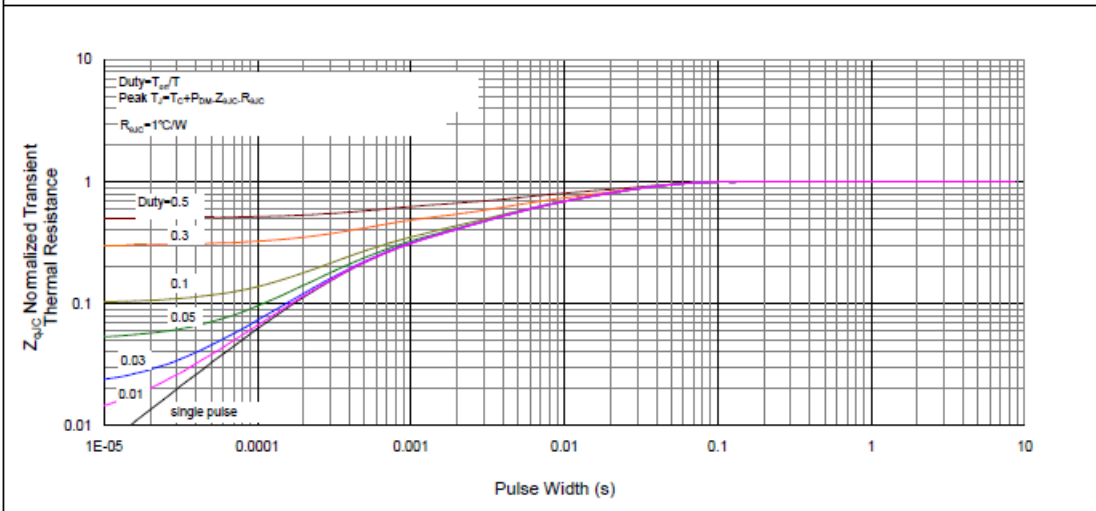


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case

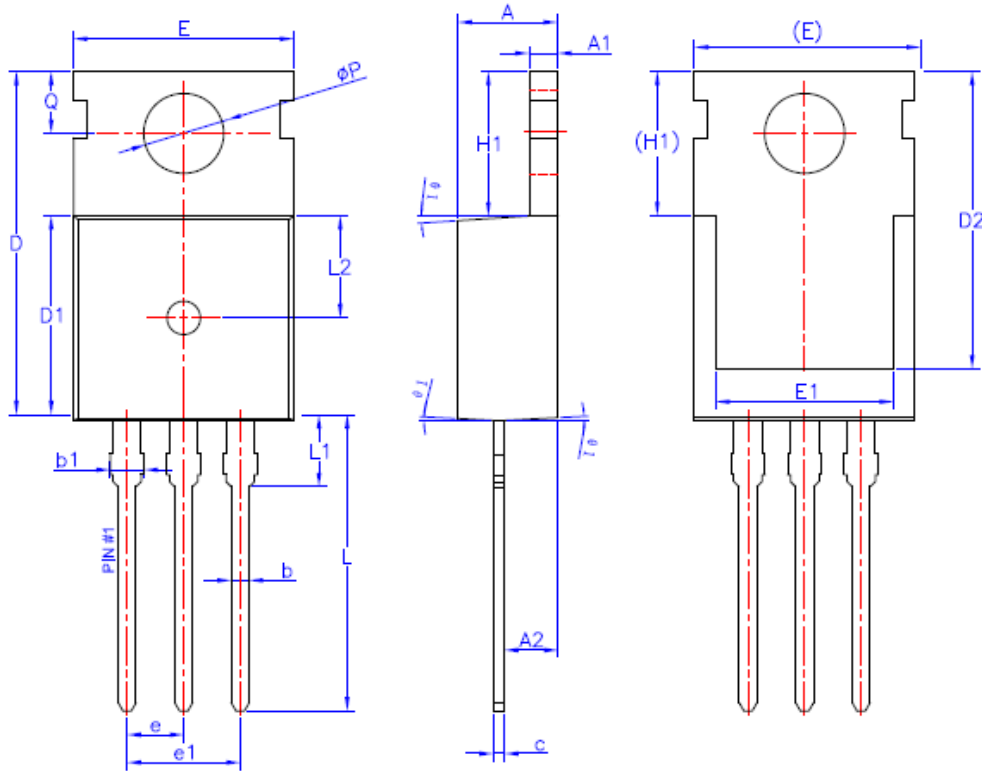




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TO-220-3L PACKAGE OUTLINE



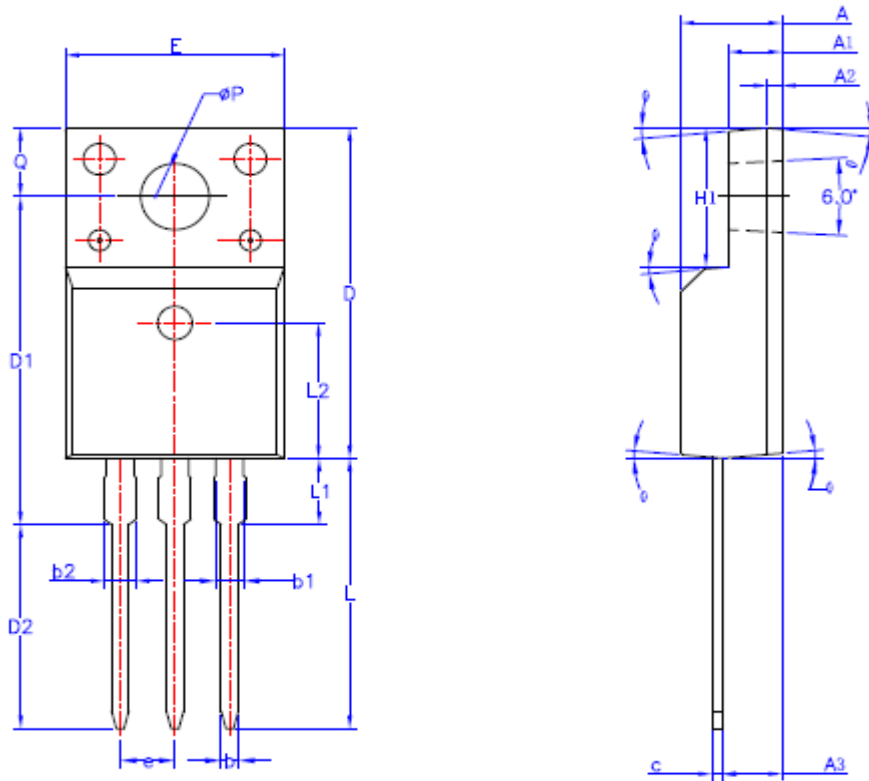
SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	0.60	0.90
b1	-	-	1.40
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	-	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.54BSC		
e1	5.08BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	-	-	3.50
L2	4.6REF		
ϕP	3.55	3.60	3.65
Q	2.73	-	2.87
$\theta 1$	1°	3°	5°



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TO-220F-3L PACKAGE OUTLINE



SYMBOL	MIN	NOM	MAX
A	4.50	4.70	4.83
A1	2.34	2.54	2.74
A2	0.7REF		
A3	2.56	2.76	2.93
b	0.70	--	0.90
b1	1.18	--	1.40
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	10.00
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		
φ P	3.08	3.18	3.28
Q	3.20	-	3.40
θ 1	1°	3°	5°



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