



SPN125T04

N-Channel Enhancement Mode MOSFET

DESCRIPTION

The SPN125T04 is the N-Channel logic enhancement mode power field effect transistor which is produced using super 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.

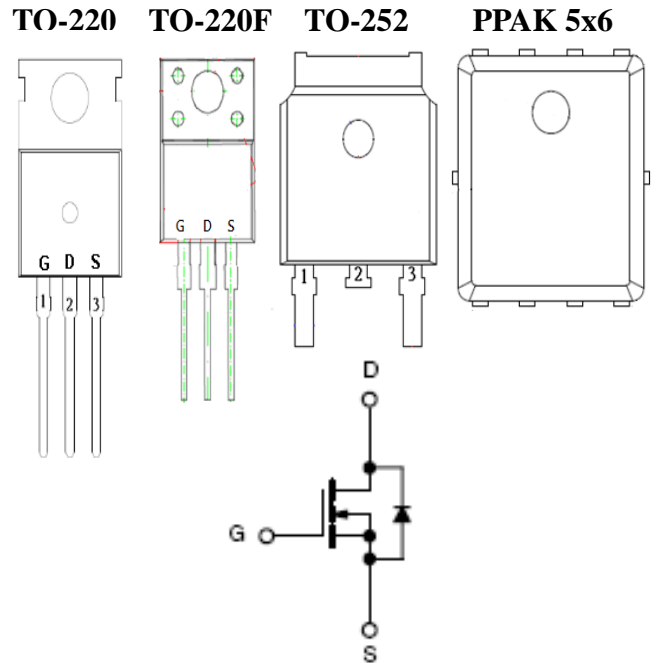
FEATURES

- ◆ 45V/125A, $R_{DS(ON)}=4.5m\Omega@V_{GS}=10V$
- ◆ 45V/125A, $R_{DS(ON)}=7.0m\Omega@V_{GS}=4.5V$
- ◆ Super high density cell design for extremely low $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-220-3L/TO-220F-3L/TO-252-2L/PPAK5x6-8L package design

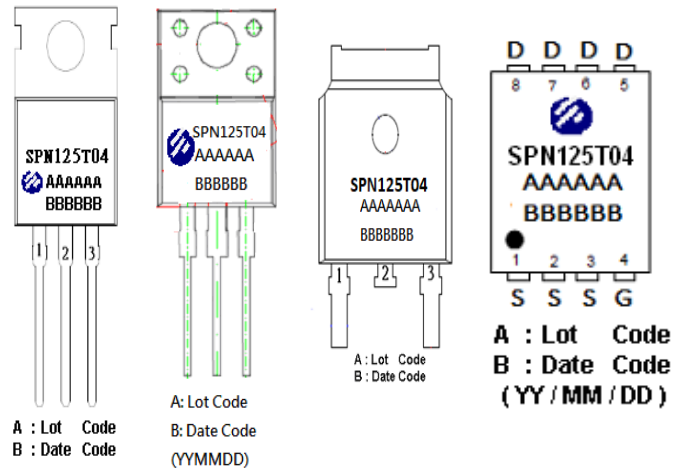
APPLICATIONS

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

PIN CONFIGURATION



PART MARKING





SPN125T04

N-Channel Enhancement Mode MOSFET

PIN DESCRIPTION

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

PIN DESCRIPTION (PPAK5x6)

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
SPN125T04T220TGB	TO-220-3L	SPN125T04
SPN125T04T220FTGB	TO-220F-3L	SPN125T04
SPN125T04T252RGB	TO-252-2L	SPN125T04
SPN125T04DN8RGB	PPAK5x6-8L	SPN125T04

- ※ SPN125T04T220TGB : Tube ; Pb – Free ; Halogen – Free
- ※ SPN125T04T220FTGB : Tube ; Pb – Free ; Halogen – Free
- ※ SPN125T04T252RGB : Tube ; Pb – Free ; Halogen – Free
- ※ SPN125T04DN8RGB : Tape&Reel ; Pb – Free ; Halogen - Free



SPN125T04

N-Channel Enhancement Mode MOSFET

ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V _{DSS}	45	V
Gate –Source Voltage	V _{GSS}	±20	V
Continuous Drain Current(TJ=150°C) (TO-220/TO-220F/TO-252)	I _D	Tc=25°C	125
		Tc=100°C	88
Continuous Drain Current(TJ=150°C) (PPAK5x6)	I _D	Tc=25°C	101
		Tc=100°C	64
Pulsed Drain Current (TO-220/TO-220F/TO-252)	I _{DM}	300	A
Pulsed Drain Current (PPAK5x6)	I _{DM}	220	A
Power Dissipation @ Tc=25°C	P _D	TO-220	104
Power Dissipation @ Tc=25°C		TO252/TO-220F	93
Power Dissipation @ Tc=25°C		PPAK5x6	83
Avalanche Energy with Single Pulse (Tc=25°C, L = 0.1mH.)	E _{AS}	141	mJ
Operating Junction Temperature	T _J	-55/150	°C
Storage Temperature Range	T _{STG}	-55/150	°C
Thermal Resistance-Junction to Case (TO-220/TO-220F)	R _{θJC}	1.2	°C/W
Thermal Resistance-Junction to Case (TO-252)	R _{θJC}	1.35	°C/W
Thermal Resistance-Junction to Case (PPAK5X6)	R _{θJC}	1.5	°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

The maximum current rating is package limited at 70A for TO-252-2L

The maximum current rating is package limited at 80A for PPAK5x6-8L



SPN125T04

N-Channel Enhancement Mode MOSFET

ELECTRICAL CHARACTERISTICS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	45			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.8	2.2	
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=45V, V_{GS}=0V$ $T_J = 25^\circ C$			1	uA
		$V_{DS}=45V, V_{GS}=0V$ $T_J = 100^\circ C$			100	
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		3.5	4.5	mΩ
		$V_{GS}=4.5V, I_D=20A$		4.6	7.0	
Forward Transconductance	g_{fs}	$V_{DS}=5V, I_D=20A$		40		S
Gate Resistance	R_G	$V_{GS}=0V, V_{DS}=\text{Open},$ $f=1MHz$		1.5		Ω
Diode Forward Voltage	V_{SD}	$I_F=20A, V_{GS}=0V$		0.9	1.2	V
Dynamic						
Total Gate Charge (10V)	Q_g	$V_{DS}=20V, V_{GS}=10V$ $I_D=20A$		42		nC
Total Gate Charge (4.5V)	Q_g			22		
Gate-Source Charge	Q_{gs}			4		
Gate-Drain Charge	Q_{gd}			10		
Input Capacitance	C_{iss}	$V_{DS}=20V, V_{GS}=0V$ $f=1MHz$		2159		pF
Output Capacitance	C_{oss}			756		
Reverse Transfer Capacitance	C_{rss}			118		
Turn-On Time	$t_d(on)$	$V_{DD}=20V, I_D=20A$ $V_{GEN}=10V, R_G=10\Omega$		12		nS
	t_r			10		
Turn-Off Time	$t_d(off)$			41		
	t_f			16		



SPN125T04 N-Channel Enhancement Mode MOSFET

TYPICAL CHARACTERISTICS

Fig 1. Typical Output Characteristics

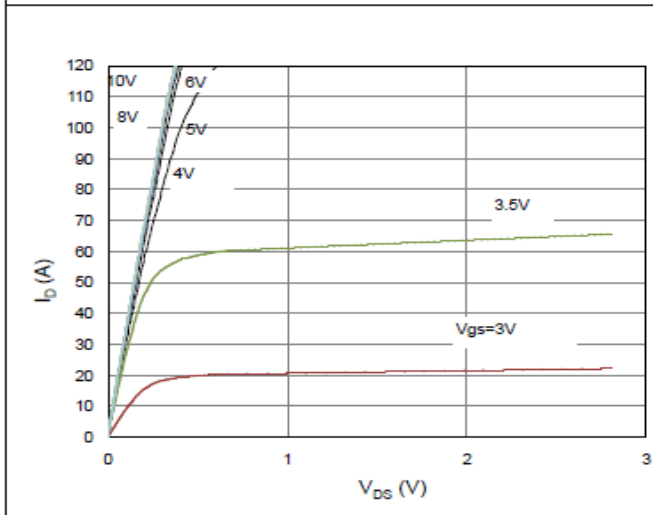


Figure 2. On-Resistance vs. Gate-Source Voltage

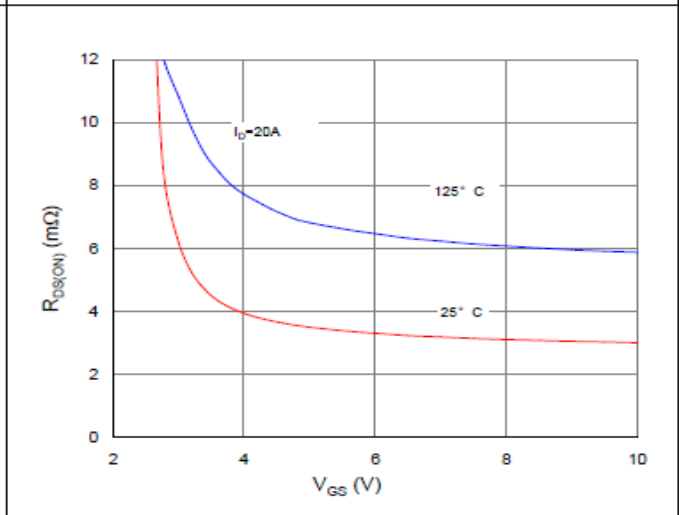


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

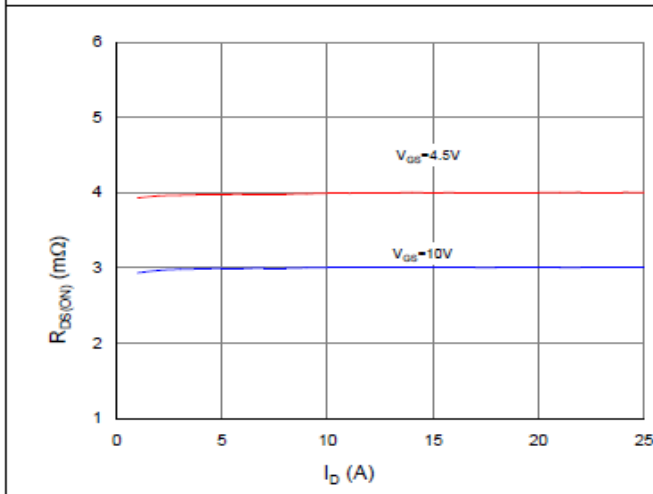


Figure 4. Normalized On-Resistance vs. Junction Temperature

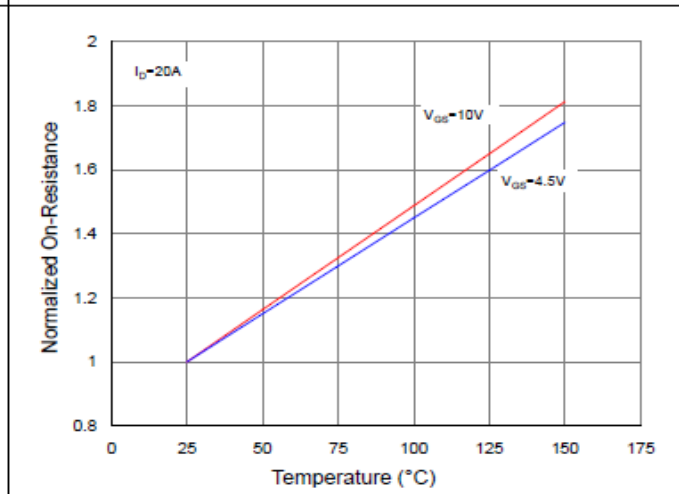


Figure 5. Typical Transfer Characteristics

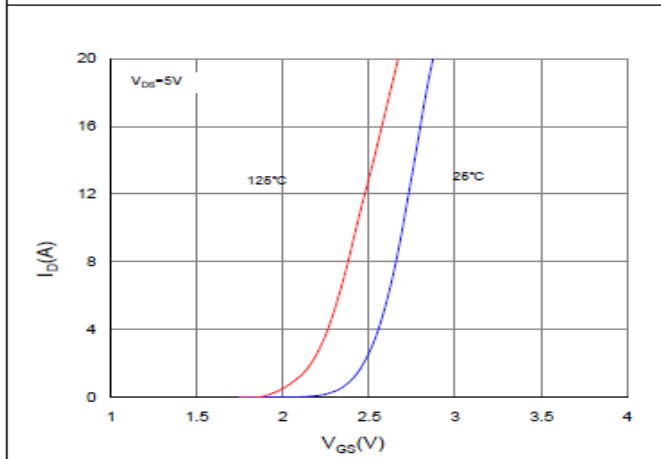
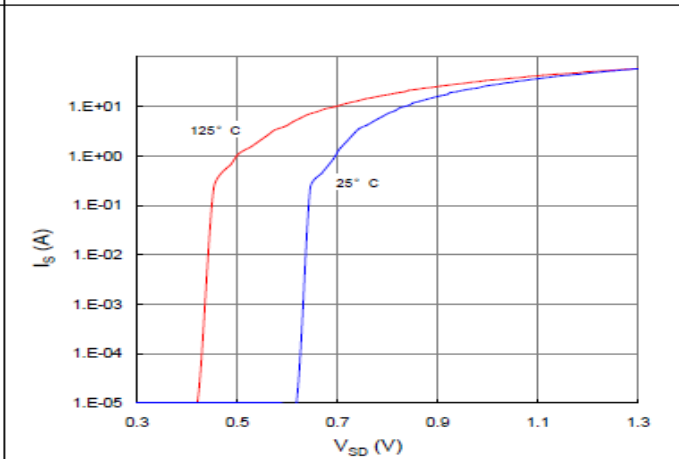


Figure 6. Typical Source-Drain Diode Forward Voltage





SPN125T04 N-Channel Enhancement Mode MOSFET

TYPICAL CHARACTERISTICS

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

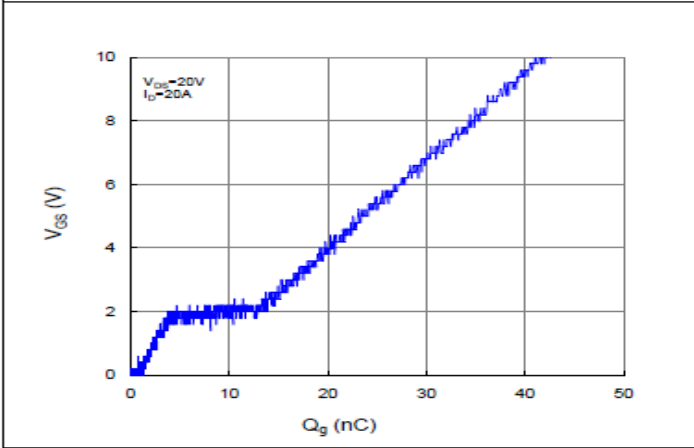


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

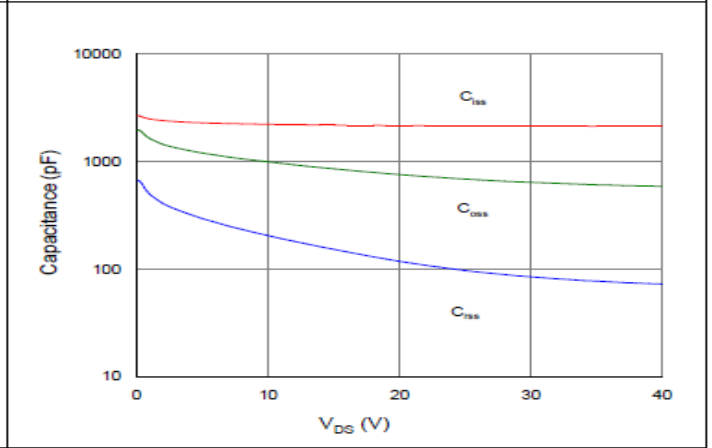


Figure 9. Maximum Safe Operating Area

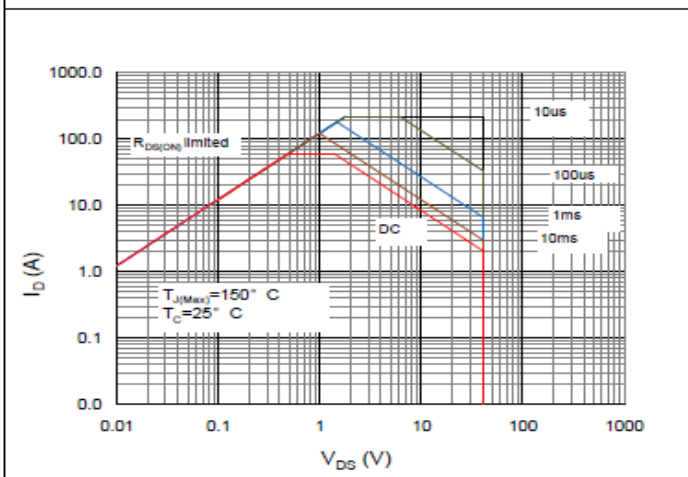


Figure 10. Maximum Drain Current vs. Case Temperature

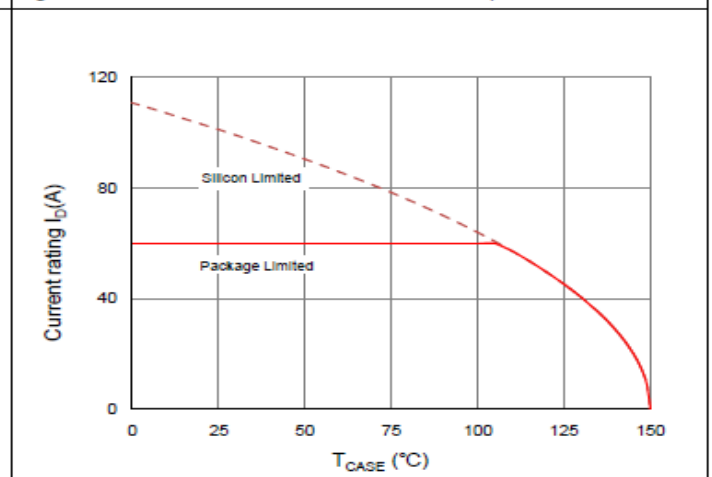
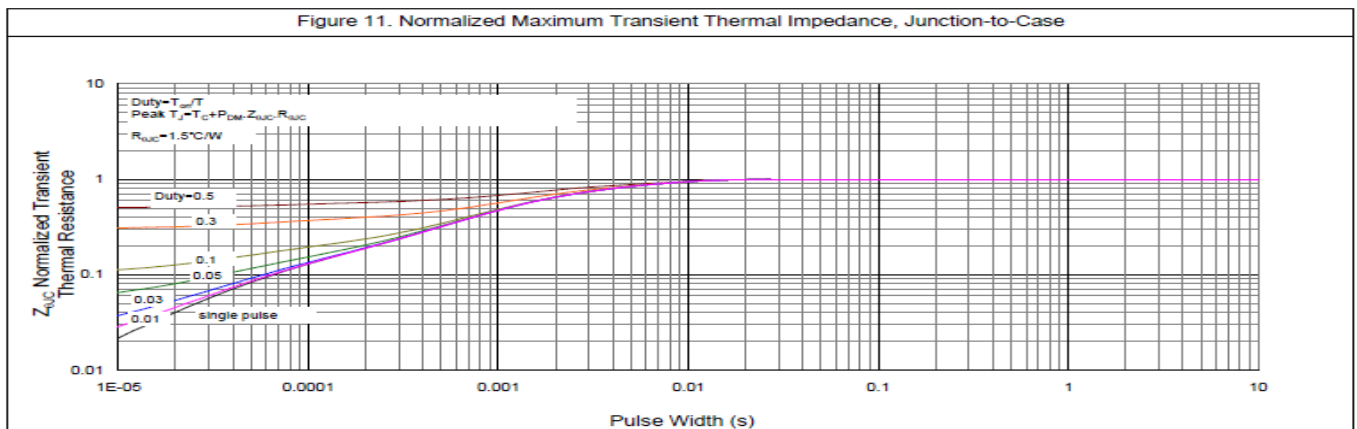


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case





SPN125T04

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

© 2020 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>