



SPN125N04A

N-Channel Enhancement Mode MOSFET

DESCRIPTION

The SPN125N04A 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

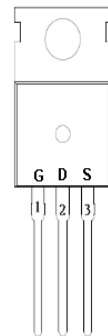
- ◆ 40V/125A, $R_{DS(ON)}=3.3m\Omega@V_{GS}=10V$
- ◆ 40V/125A, $R_{DS(ON)}=4.5m\Omega@V_{GS}=4.5V$
- ◆ Super high density cell design for extremely low $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-220-3L/TO-220F-3L/TO-252-2L package design

APPLICATIONS

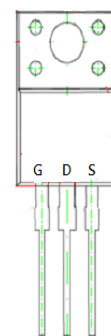
- DC/DC Converter
- Load Switch
- SMPS Secondary Side Synchronous Rectifier
- Motor Control
- Power Tool

PIN CONFIGURATION

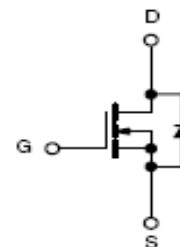
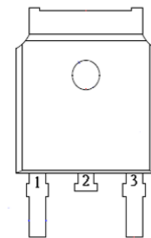
TO-220



TO-220F



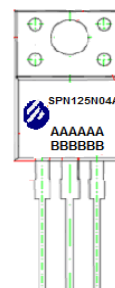
TO-252



PART MARKING



A : Lot Code
B : Date Code



A: Lot Code
B: Date Code
(YYMMDD)



A : Lot Code
B : Date Code



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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
SPN125N04AT220TGB	TO-220-3L	SPN125N04A
SPN125N04AT220FTGB	TO-220F-3L	SPN125N04A
SPN125N04AT252RGB	TO-252-2L	SPN125N04A

- ※ SPN125N04AT220TGB : Tube ; Pb – Free ; Halogen – Free
- ※ SPN125N04AT220FTGB : Tube ; Pb – Free ; Halogen – Free
- ※ SPN125N04AT252RGB : Tube ; Pb – Free ; Halogen – Free

ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V _{DSS}	40	V
Gate –Source Voltage	V _{GSS}	±20	V
Continuous Drain Current(TJ=150°C) (TO-220/TO-220F/TO-252)	I _D	125	A
		88	
Pulsed Drain Current (TO-220/TO-220F/TO-252)	I _{DM}	300	A
Power Dissipation @ Tc=25°C	P _D	104	W
Power Dissipation @ Tc=25°C		93	
Avalanche Energy with Single Pulse (Tc=25°C, L = 0.1mH.)	E _{AS}	145	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

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



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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 =250uA	40			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250uA	1	1.8	2.2	
Gate Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =45V, V _{GS} =0V T _J = 25 °C			1	uA
		V _{DS} =45V, V _{GS} =0V T _J = 100 °C			100	
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A			3.3	mΩ
		V _{GS} =4.5V, I _D =20A			4.5	
Forward Transconductance	g _{fs}	V _{DS} =5V, I _D =20A		75		S
Gate Resistance	R _G	V _{GS} =0V, V _{DS} =Open, f=1MHz		1.5		Ω
Diode Forward Voltage	V _{SD}	I _F =1A, V _{GS} =0V			1	V
Dynamic						
Total Gate Charge (10V)	Q _g	V _{DS} =20V, V _{GS} =10V I _D =20A		44		nC
Total Gate Charge (4.5V)	Q _g			23		
Gate-Source Charge	Q _{gs}			7.5		
Gate-Drain Charge	Q _{gd}			5.5		
Input Capacitance	C _{iss}	V _{DS} =20V, V _{GS} =0V f=1MHz		2648		pF
Output Capacitance	C _{oss}			899		
Reverse Transfer Capacitance	C _{rss}			71		
Turn-On Time	td(on)	V _{DD} =20V, I _D =20A V _{GEN} =10V, R _G =3Ω		10		nS
	tr			5		
Turn-Off Time	td(off)			33		
	tf			6.5		



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TYPICAL CHARACTERISTICS

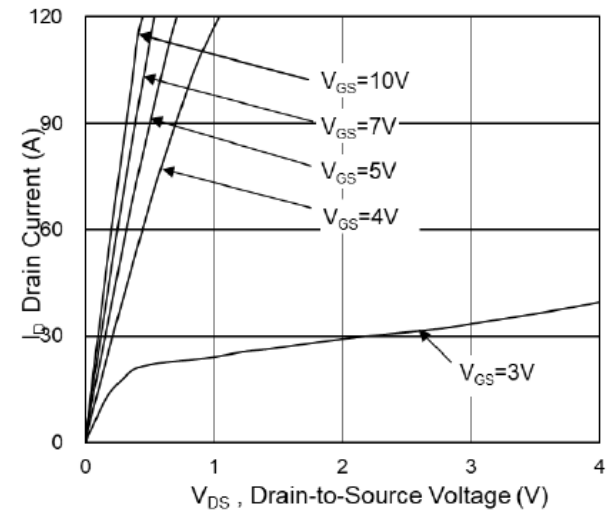


Fig. 1 Typical Output Characteristics

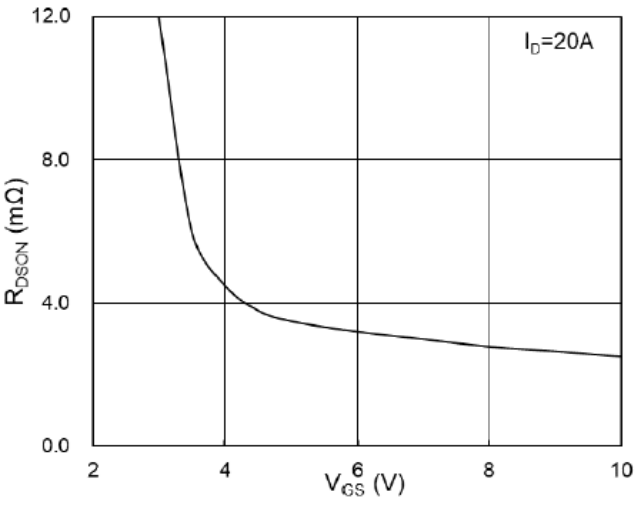


Fig. 2 On-Resistance vs. V_{GS}

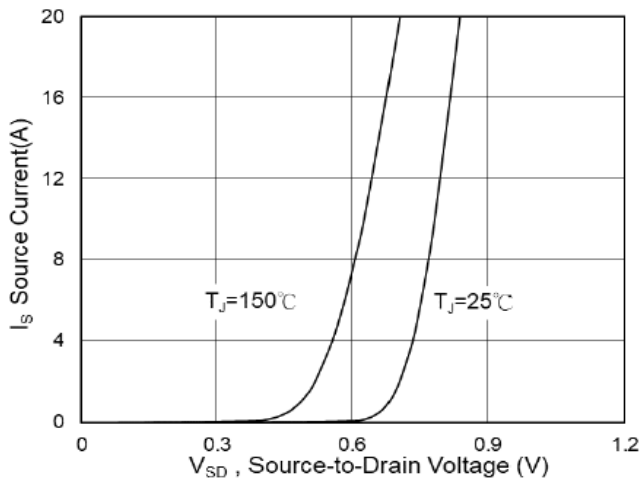


Fig. 3 Source-Drain Forward Characteristics

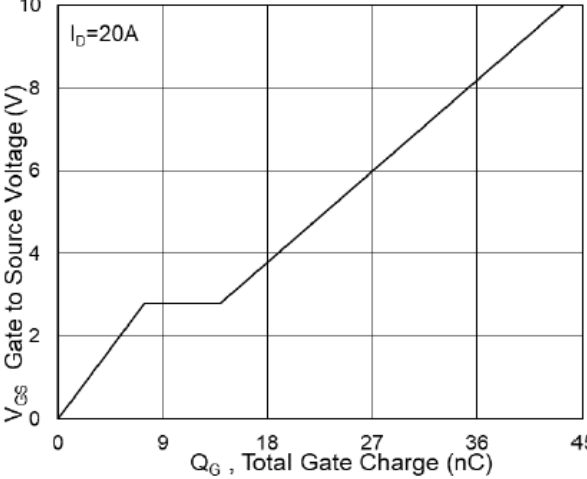


Fig. 4 Gate Charge Characteristics

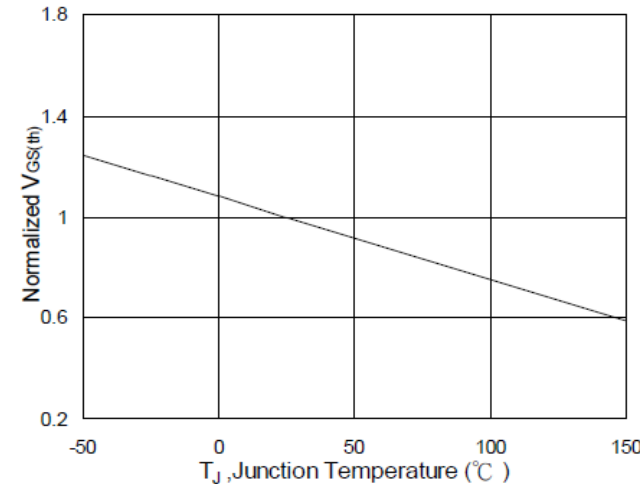


Fig. 5 Normalized V_{GS} vs T_J

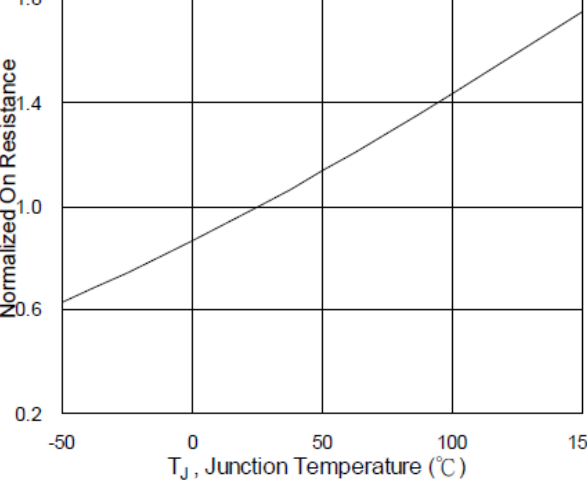


Fig. 6 Normalized R_{dson} vs T_J



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TYPICAL CHARACTERISTICS

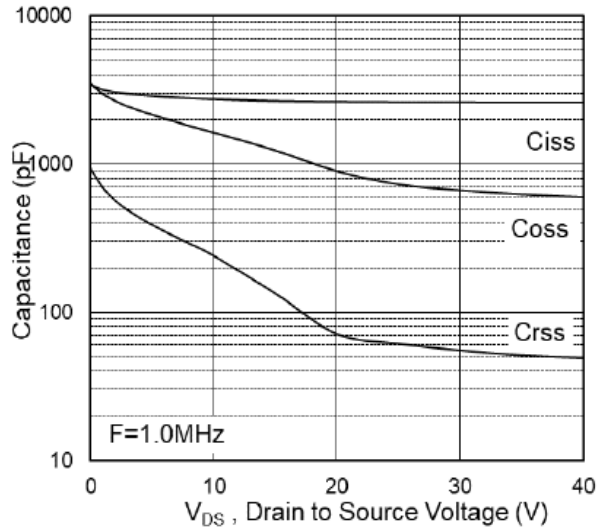


Fig. 7 Capacitance

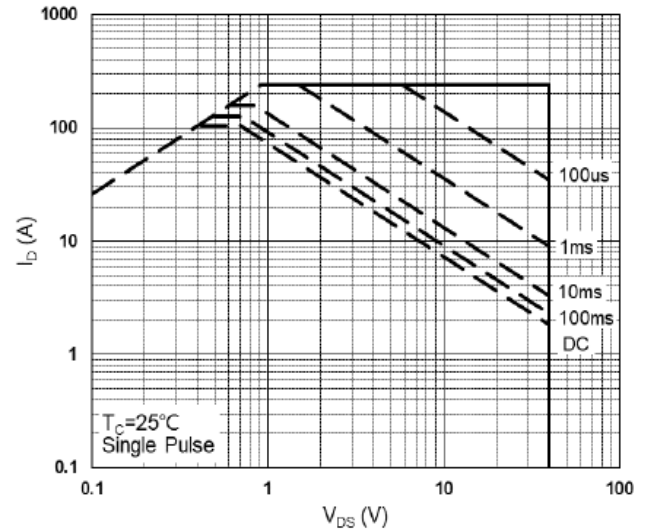


Fig. 8 Safe Operation Area

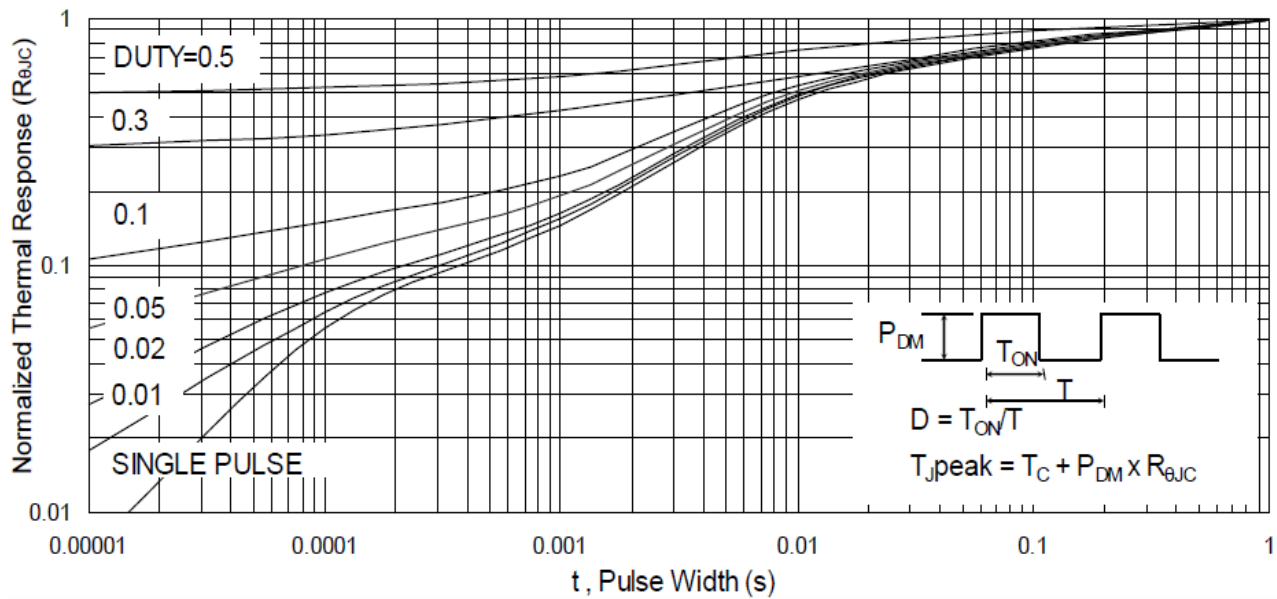


Fig. 9 Normalized Maximum Transient Thermal Impedance



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