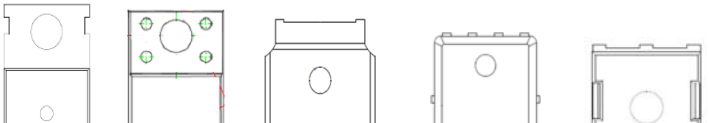
SPN166N06
N-Channel Enhancement Mode MOSFET

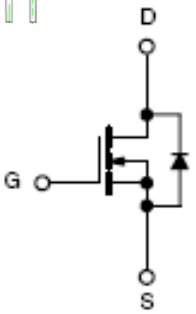
DESCRIPTION
The SPN166N06 is the N-Channel enhancement mode power field effect transistor which is produced using super high cell density DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suitable for synchronous rectifier 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.

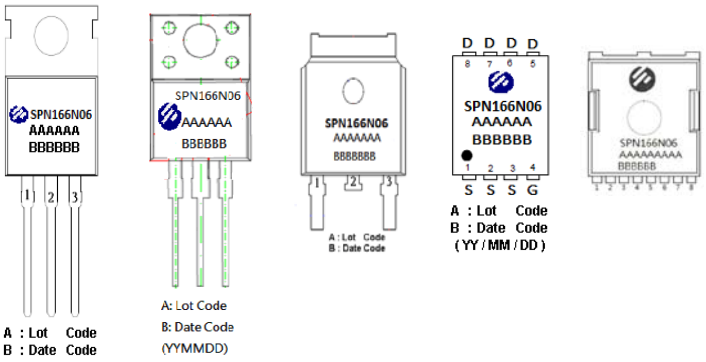
APPLICATIONS
- DC/DC Converter
- Load Switch
- SMPS Secondary Side Synchronous Rectifier
- Motor Control
- Power Tool

FEATURES
- 60V/166A,$R_{DS(ON)}$=3.1mΩ@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-252-2L/PPAK5x6-8L/ TOLL-8 package design

PIN CONFIGURATION
TO-220 TO-220F TO252 PPAK5x6 TOLL8





PART MARKING


SPN166N06
N-Channel Enhancement Mode MOSFET

PIN DESCRIPTION
TO220/TO220F/TO252

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

PPAK5x6 PIN DESCRIPTION

Pin	Symbol	Description
1~3	S	Source
4	G	Gate
5~8	D	Drain

TOLL-8

Pin	Symbol	Description
1	G	Gate
2~8	S	Source
Tab	D	Drain

ORDERING INFORMATION

Part Number	Package	Part Marking
SPN166N06T220TGB	TO-220-3L	SPN166N06
SPN166N06T220FTGB	TO-220F-3L	SPN166N06
SPN166N06T252RGB	TO-252-2L	SPN166N06
SPN166N06DN8RGB	PPAK5x6-8L	SPN166N06
SPN166N06TOL8RGB	TOLL-8	SPN166N06

※ SPN166N06T220TGB : Tube ; Pb – Free ; Halogen – Free
※ SPN166N06T220FTGB : Tube ; Pb – Free ; Halogen – Free
※ SPN166N06T252RGB : Tape&Reel ; Pb – Free ; Halogen - Free
※ SPN166N06DN8RGB : Tape&Reel ; Pb – Free ; Halogen – Free
※ SPN166N06TOL8RGB: Tape&Reel ; Pb – Free ; Halogen – Free

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ABSOULTE MAXIMUM RATINGS

(T_A=25℃ Unless otherwise noted)

Parameter		Symbol	Typical	Unit
Drain-Source Voltage		V_{DSS}	60	V
Gate –Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Silicon Limited)	Tc=25℃	I_D	181	A
	Tc=100℃		128	
Pulsed Drain Current		I_{DM}	400	A
Power Dissipation @ Tc=25℃	TO-220	P_D	104	W
	TO-252		93	
	PPAK5x6		83	
	TOLL-8		297	
Avalanche Energy with Single Pulse (Tc=25℃, L=0.1mH.)		E_{AS}	259	mJ
Operating Junction Temperature		T_J	-55/175	℃
Storage Temperature Range		T_{STG}	-55/175	℃
Thermal Resistance-Junction to Case (TO-220/TO-220F)		$R_{\theta JC}$	1.2	℃/W
Thermal Resistance-Junction to Case (TO-252)		$R_{\theta JC}$	1.35	℃/W
Thermal Resistance-Junction to Case (PPAK5x6)		$R_{\theta JC}$	1.5	℃/W
Thermal Resistance-Junction to Case (TOLL-8)		$R_{\theta JC}$	0.42	℃/W

Note :

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

ELECTRICAL CHARACTERISTICS

(T_A=25℃ Unless otherwise noted)

Parameter		Symbol	Conditions	Min.	Typ	Max.	Unit
Static							
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	V_{GS}=0V,I_D=250uA	60			V
Gate Threshold Voltage		$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	2.0		4.0	
Gate Leakage Current		I_{GSS}	V_{DS}=0V,V_{GS}=±20V			±100	nA
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=48V, V_{GS}=0V T_J =25°C			1	uA
			V_{DS}=48V, V_{GS}=0V T_J =100°C			100	
Drain-Source On-Resistance	PPAK5x6, TOLL8	$R_{DS(on)}$	V_{GS}=10V,I_D=20A		2.6	3.1	mΩ
	TO220,TO220F, TO252				2.9	3.3	
Forward Transconductance		gfs	V_{DS}=5V,I_D=20A		66		S
Diode Forward Voltage		V_{SD}	I_S=20A ,V_{GS}=0V		0.9	1.2	V
Gate Resistance		R_G	V_{GS}=0V,V_{DS} open, f=1MHz		1.25		Ω
Dynamic							
Total Gate Charge (10V)		Q_g	V_{DS}=30V,V_{GS}=10V I_D=20A		66		nC
Gate-Source Charge		Q_{gs}			16		
Gate-Drain Charge		Q_{gd}			16		
Input Capacitance		C_{iss}	V_{DS}=30V,V_{GS}=0V f=1MHz		4348		pF
Output Capacitance		C_{oss}			1501		
Reverse Transfer Capacitance		C_{rss}			92		
Turn-On Time		td(on)	V_{DD}=30V, ID=20A V_{GEN}=10V,R_G=10Ω		15		nS
		tr			12		
Turn-Off Time		td(off)			52		
		tf			19		

TYPICAL CHARACTERISTICS

Fig 1. Typical Output Characteristics

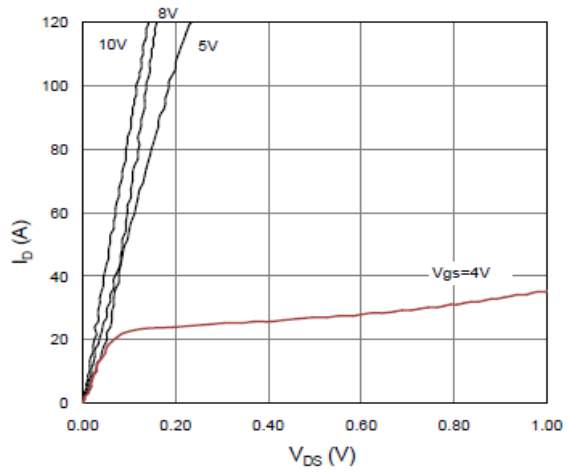


Figure 2. On-Resistance vs. Gate-Source Voltage

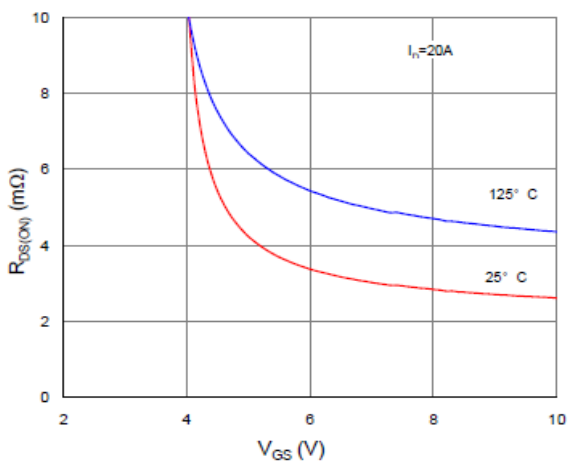


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

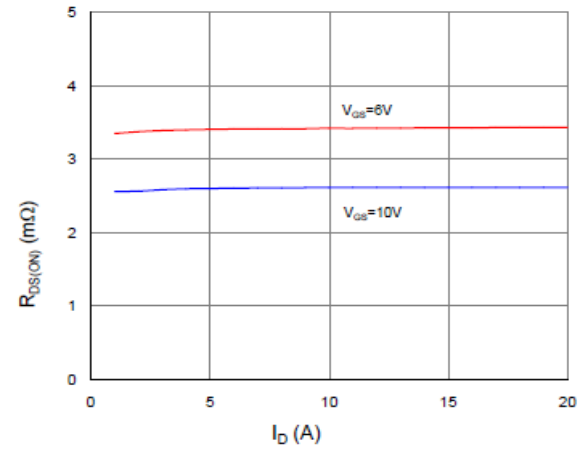


Figure 4. Normalized On-Resistance vs. Junction Temperature

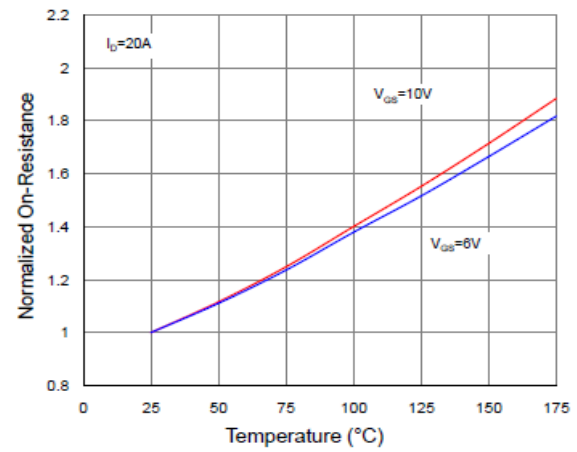


Figure 5. Typical Transfer Characteristics

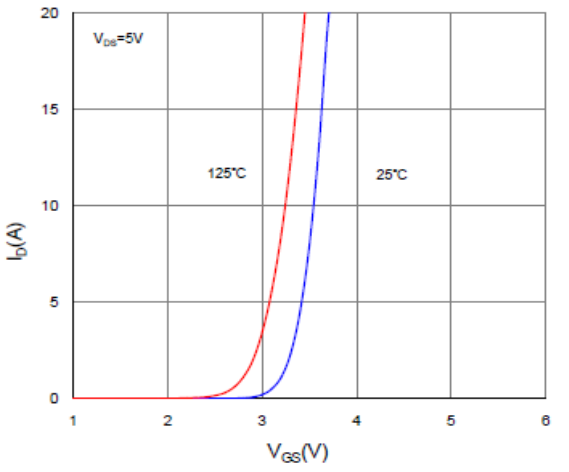
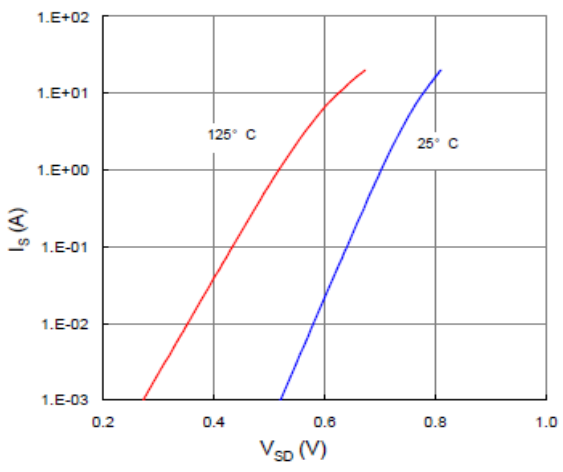


Figure 6. Typical Source-Drain Diode Forward Voltage



TYPICAL CHARACTERISTICS

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

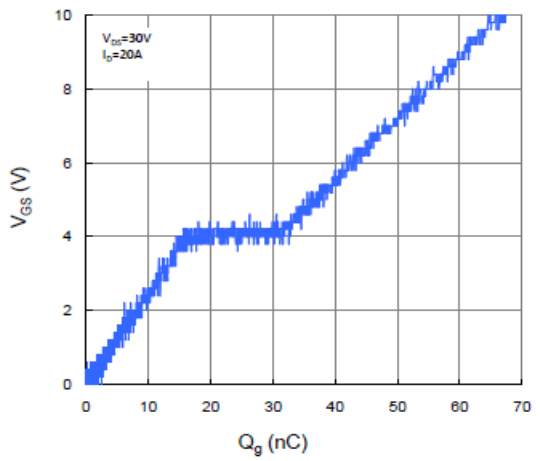


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

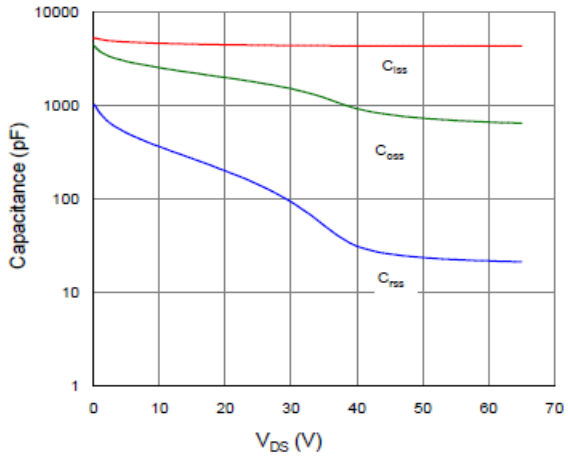


Figure 9. Maximum Safe Operating Area

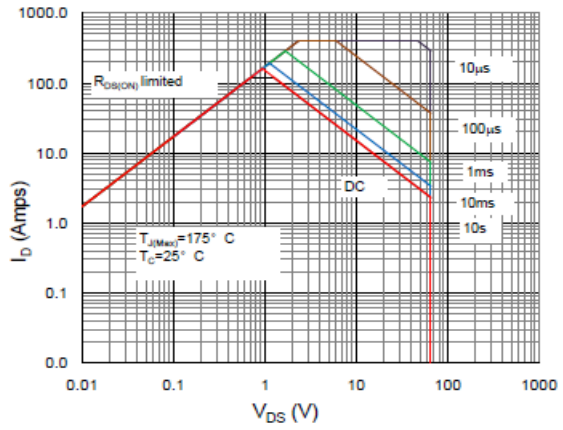


Figure 10. Maximun Drain Current vs. Case Temperature

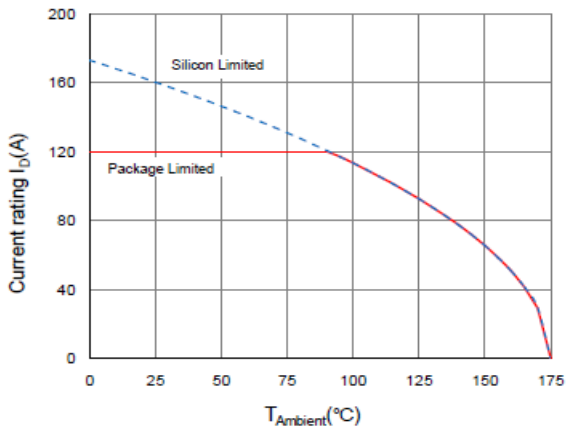
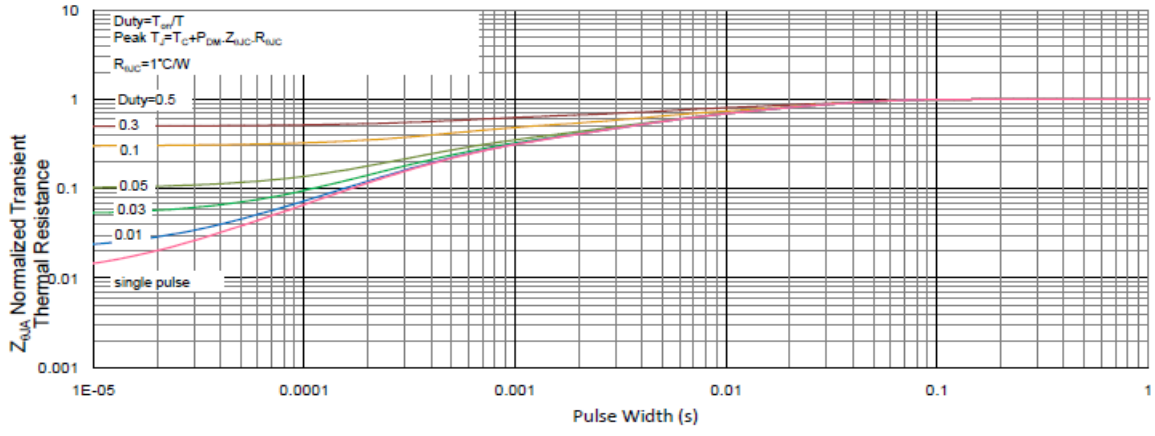


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient



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