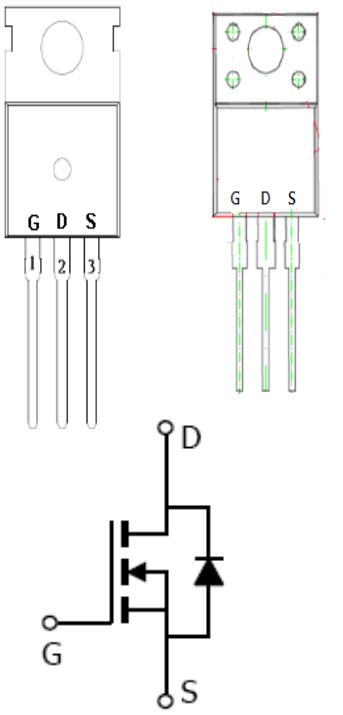
SPN120T20
N-Channel Enhancement Mode MOSFET

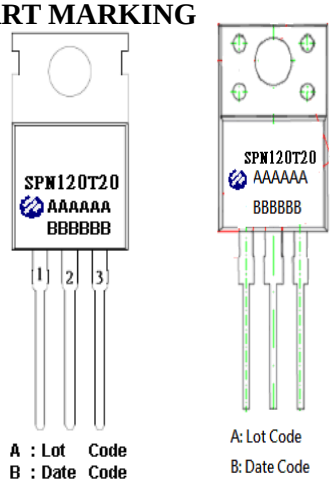
DESCRIPTION
The SPN120T20 is the N-Channel enhancement mode power field effect transistor which is produced using super high cell density DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suitable for synchronous rectifier 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
- AC/DC Synchronous Rectifier
- Load Switch
- UPS
- Power Tool
- Motor Control

FEATURES
- 200V/120A, $R_{DS(ON)}$=11mΩ@V_{GS}=10V
- 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-220-3L **TO-220F-3L**



PART MARKING


SPN120T20
N-Channel Enhancement Mode MOSFET

PIN DESCRIPTION

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

ORDERING INFORMATION

Part Number	Package	Part Marking
SPN120T20T220TGB	TO-220-3L	SPN120T20
SPN120T20T220FTGB	TO-220F-3L	SPN120T20

※ SPN120T20T220TGB : Tube ; Pb – Free ; Halogen – Free
※ SPN120T20T220FTGB : Tube ; Pb – Free ; Halogen - Free

ABSOULTE MAXIMUM RATINGS

(T_A=25℃ Unless otherwise noted)

Parameter		Symbol	Typical	Unit
Drain-Source Voltage		V_{DSS}	200	V
Gate –Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Silicon Limited)	T_C=25℃	I_D	132	A
	T_C=100℃		93	
Pulsed Drain Current		I_{DM}	370	A
Avalanche Energy, Single Pulse @ L=0.4mH, T_C=25℃		E_{AS}	720	mJ
Power Dissipation @ T_C=25℃		P_D	429	W
Operating Junction Temperature		T_J	-55/175	℃
Storage Temperature Range		T_{STG}	-55/175	℃
Thermal Resistance-Junction to Ambient		$R_{\theta JA}$	60	℃/W
Thermal Resistance-Junction to Case		$R_{\theta JC}$	0.35	℃/W

SPN120T20
N-Channel Enhancement Mode MOSFET

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	200			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	2.0	3.0	4.0	
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}=±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=200V,V_{GS}=0V T_J=25℃			1	uA
		V_{DS}=200V,V_{GS}=0V T_J=100℃			100	
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=20A		9.4	11	mΩ
Forward Transconductance	gfs	V_{DS}=5V,I_D=20A		70		S
Gate Resistance	R_G	V_{GS}=0V,V_{DS}=Open, f=1MHz		4.0		Ω
Diode Forward Voltage	V_{SD}	I_S=20A,V_{GS}=0V		0.9		V
Dynamic						
Total Gate Charge	Q_g	V_{DS}=100V, V_{GS}=10V I_D=20A		56		nC
Gate-Source Charge	Q_{gs}			18		
Gate-Drain Charge	Q_{gd}			5		
Input Capacitance	C_{iss}	V_{DS}=100V,V_{GS}=0V f=1MHz		4970		pF
Output Capacitance	C_{oss}			420		
Reverse Transfer Capacitance	C_{rss}			7.5		
Turn-On Time	$t_{d(on)}$	V_{DD}=100V, V_{GS}=10V I_D=20A, R_G=10Ω		16		nS
	t_r			22		
Turn-Off Time	$t_{d(off)}$			38		
	t_f			10		

TYPICAL CHARACTERISTICS

Fig 1. Typical Output Characteristics

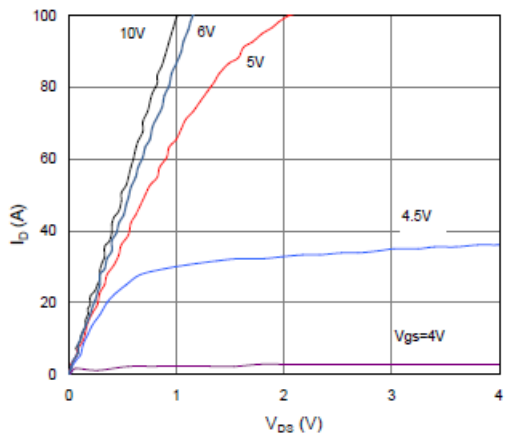


Figure 2. On-Resistance vs. Gate-Source Voltage

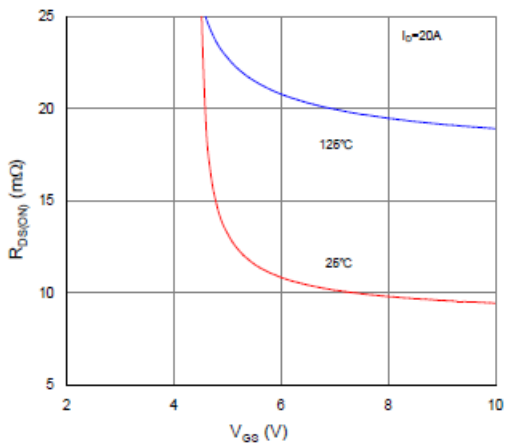


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

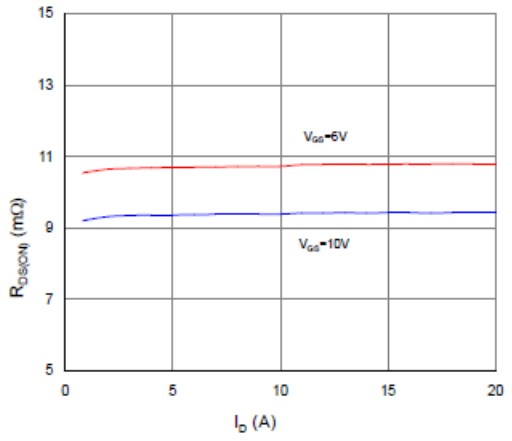


Figure 4. Normalized On-Resistance vs. Junction Temperature

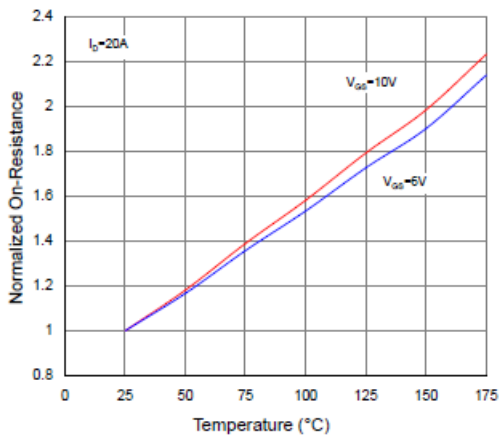


Figure 5. Typical Transfer Characteristics

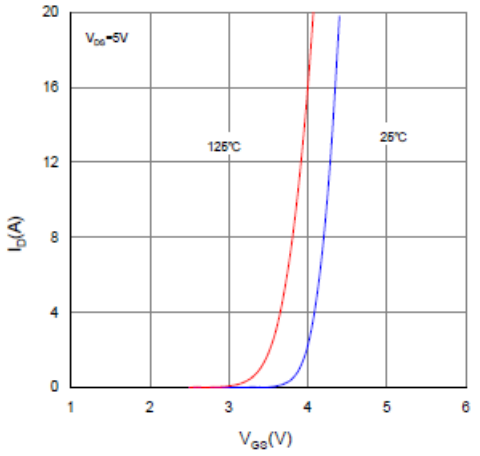
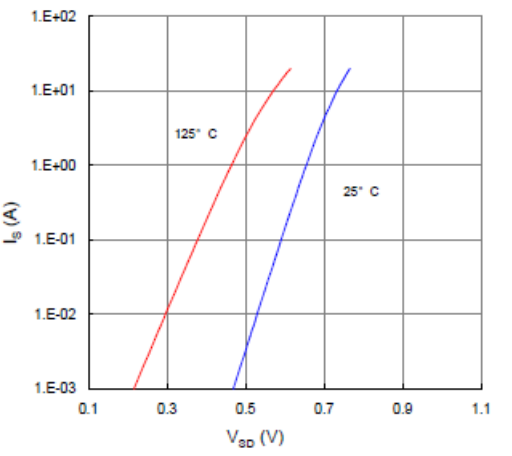


Figure 6. Typical Source-Drain Diode Forward Voltage



TYPICAL CHARACTERISTICS

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

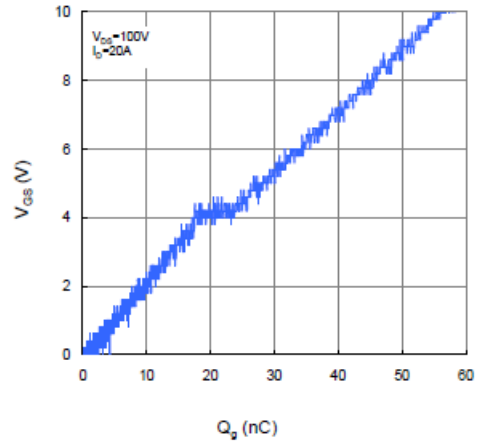


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

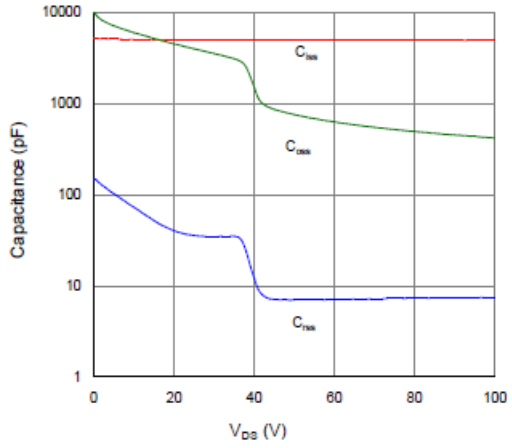


Figure 9. Maximum Safe Operating Area

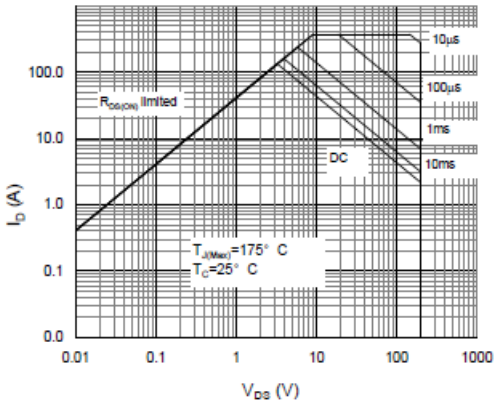


Figure 10. Maximun Drain Current vs. Case Temperature

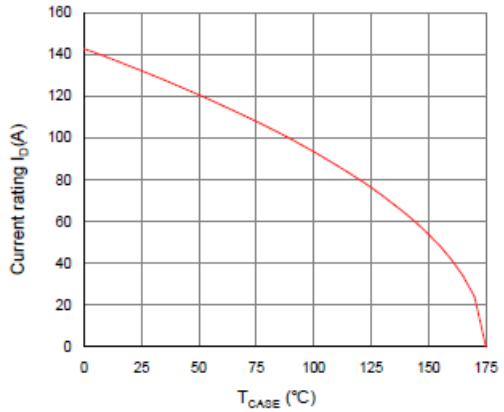
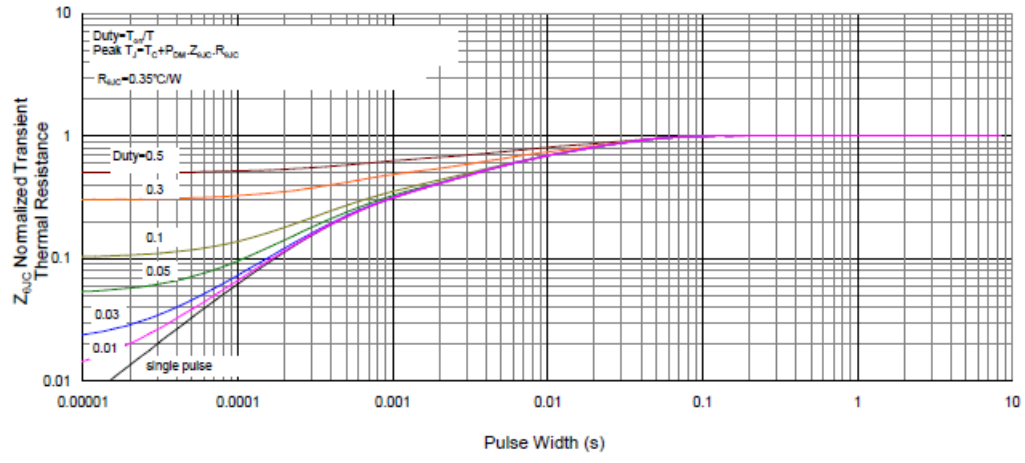
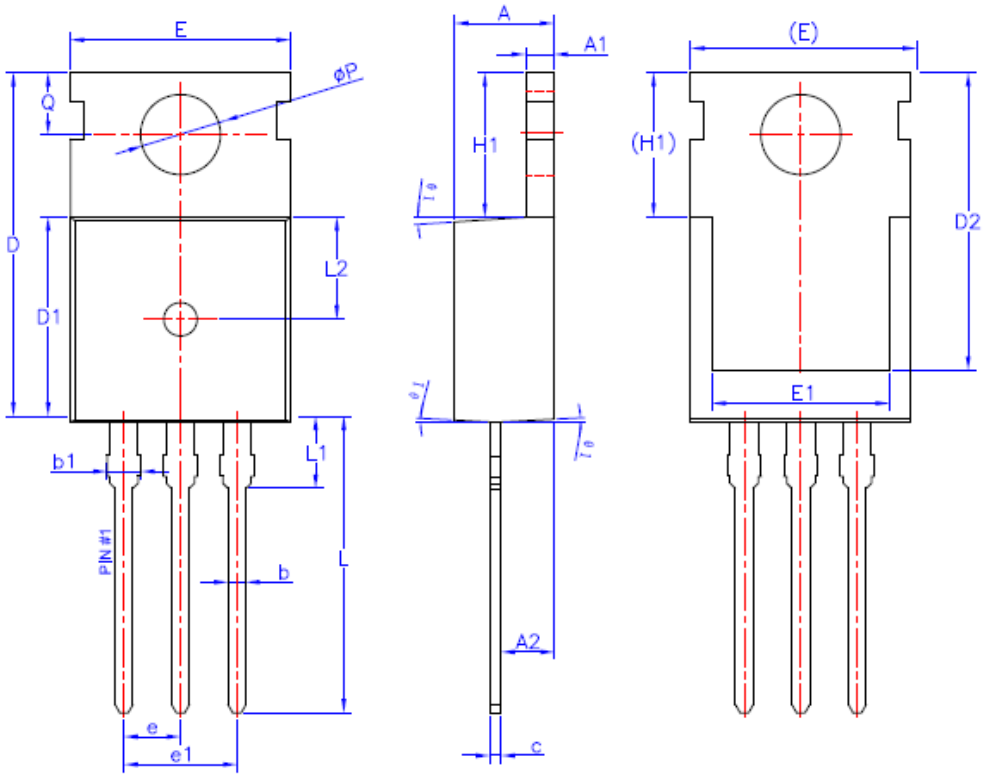


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case

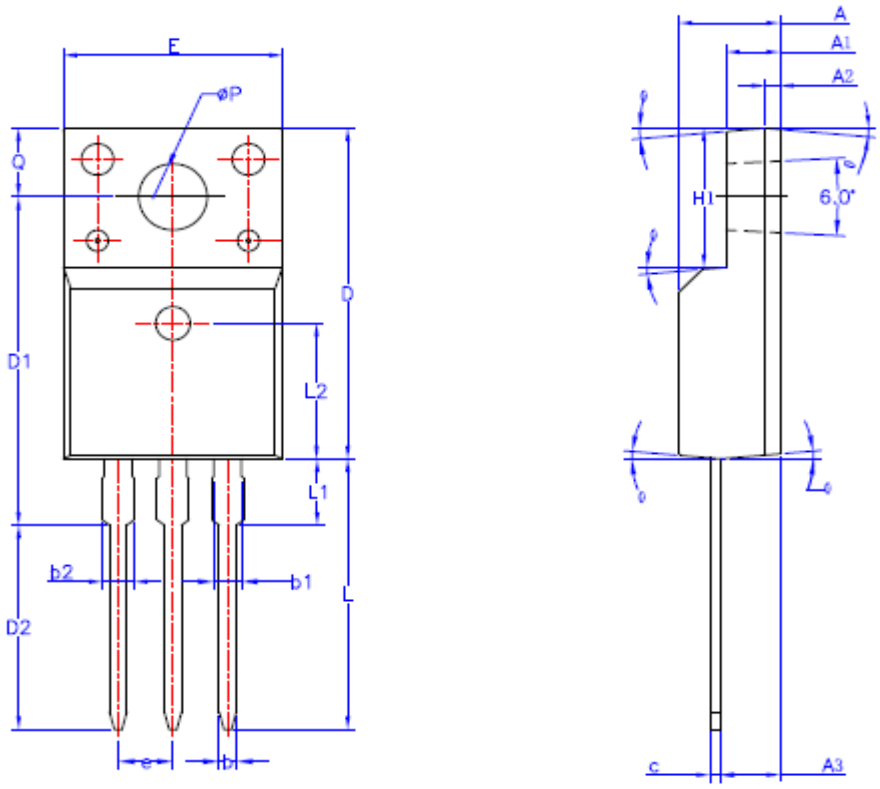


TO-220-3L PACKAGE OUTLINE



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	–	0.90
b1	1.27	–	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	4.60REF		
øP	3.55	3.60	3.65
Q	2.73	–	2.87
θ1	1°	3°	5°

TO-220F-3L PACKAGE OUTLINE



SYMBOL	MIN	NOM	MAX
A	4.50	4.70	4.83
A1	2.34	2.54	2.74
A2		0.70 REF	
A3	2.56	2.76	2.93
b	0.70	—	0.90
b1	1.18	—	1.38
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	10.0
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	
øP	3.08	3.18	3.28
Q	3.20	—	3.40
θ1	1°	3°	5°

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