



SPN60T15 N-Channel Enhancement Mode MOSFET

DESCRIPTION

The SPN60T15 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.

FEATURES

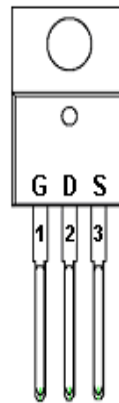
- ◆ 150V/60A, $R_{DS(ON)}=19m\Omega@V_{GS}=10V$
- ◆ High density cell design for extremely low $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-220-3L/TO-220F-3L package design

APPLICATIONS

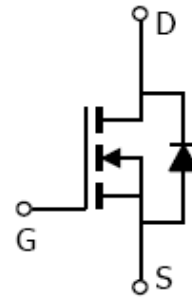
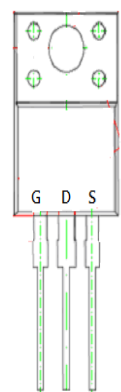
- AC/DC Synchronous Rectifier
- Load Switch
- UPS
- Power Tool
- Motor Control

PIN CONFIGURATION

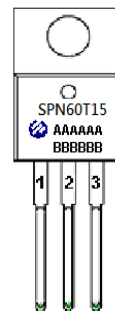
TO-220



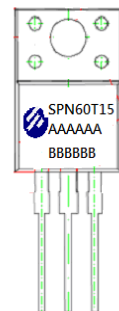
TO-220F



PART MARKING



A : Lot Code
B : Date Code
(YY / MM / DD)



A: Lot Code
B: Date Code
(YYMMDD)



SPN60T15

N-Channel Enhancement Mode MOSFET

TO-220/TO-220F PIN DESCRIPTION

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

ORDERING INFORMATION

Part Number	Package	Part Marking
SPN60T15T220TGB	TO-220-3L	SPN60T15
SPN60T15T220FTGB	TO-220F-3L	SPN60T15

※ SPN60T15T220TGB : Tube ; Pb – Free ; Halogen – Free

※ SPN60T15T220FTGB : Tube ; Pb – Free ; Halogen - Free

ABSOLUTE MAXIMUM RATINGS

(T_j=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit	
Drain-Source Voltage	V _{DSS}	150	V	
Gate –Source Voltage	V _{GSS}	±20	V	
Continuous Drain Current(Silicon Limited)	I _D	T _C =25°C	60	A
		T _C =100°C	38	
Pulsed Drain Current(TO-220/TO-220F)	I _{DM}	150	A	
Avalanche Energy, Single Pulse @ L=0.1mH, T _C =25°C	E _{AS}	292	mJ	
Power Dissipation @ T _C =25°C (TO-220/TO-220F)	P _D	214	W	
Operating Junction Temperature(TO-220/TO-220F)	T _J	-55/150	°C	
Storage Temperature Range(TO-220/TO-220F)	T _{STG}	-55/150	°C	
Thermal Resistance-Junction to Ambient (TO-220/TO-220F)	R _{θJA}	60	°C/W	
Thermal Resistance-Junction to Case (TO-220/TO-220F)	R _{θJC}	0.7	°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	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	150			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.0	4.0	V
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=150V, V_{GS}=0V$ $T_J=25^\circ C$			1	uA
		$V_{DS}=150V, V_{GS}=0V$ $T_J=100^\circ C$			100	
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		15	19	mΩ
Forward Transconductance	g_{fs}	$V_{DS}=5V, I_D=20A$		50		S
Gate Resistance	R_G	$V_{GS}=0V, V_{DS}=Open,$ $f=1MHz$		3.5		Ω
Diode Forward Voltage	V_{SD}	$I_S=20A, V_{GS}=0V$		0.9	1.2	V
Dynamic						
Total Gate Charge	Q_g	$V_{DS}=75V, V_{GS}=10V$ $I_D=20A$		27		nC
Gate-Source Charge	Q_{gs}			9		
Gate-Drain Charge	Q_{gd}			2		
Input Capacitance	C_{iss}	$V_{DS}=75V, V_{GS}=0V$ $f=1MHz$		2275		pF
Output Capacitance	C_{oss}			165		
Reverse Transfer Capacitance	C_{rss}			5.5		
Turn-On Time	$t_{d(on)}$	$V_{DD}=75V, V_{GS}=10V$ $I_D=20A, R_G=10\Omega$		12		nS
	t_r			4		
Turn-Off Time	$t_{d(off)}$			24		
	t_f			5		



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TYPICAL CHARACTERISTICS

Fig 1. Typical Output Characteristics

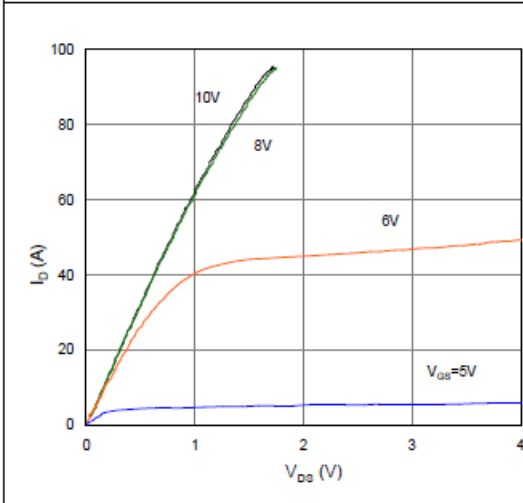


Figure 2. On-Resistance vs. Gate-Source Voltage

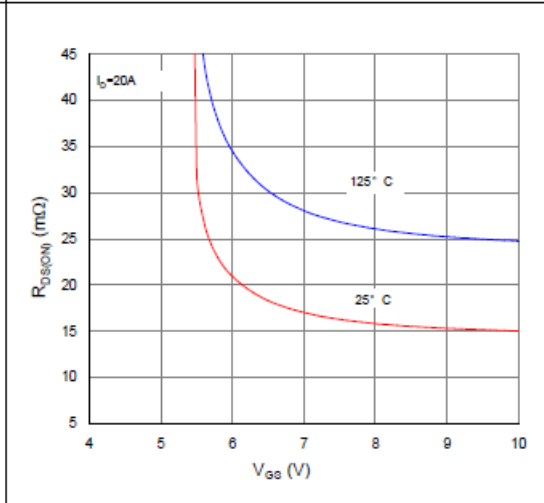


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

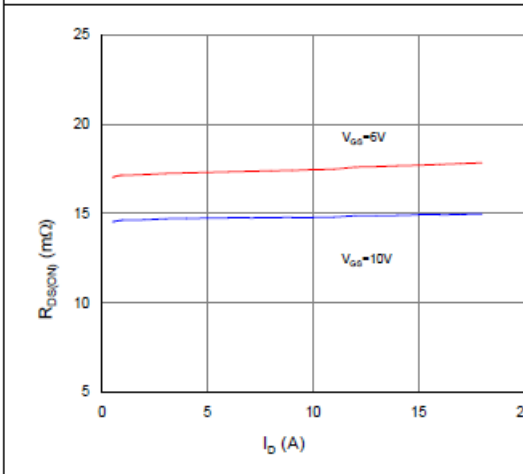


Figure 4. Normalized On-Resistance vs. Junction Temperature

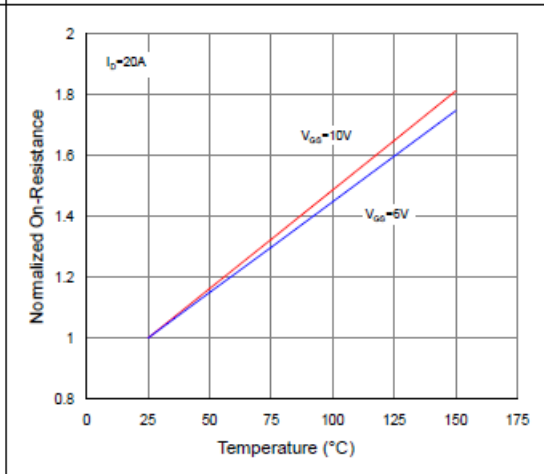


Figure 5. Typical Transfer Characteristics

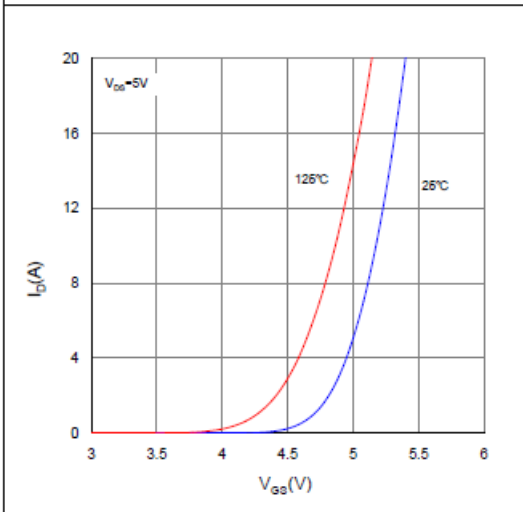
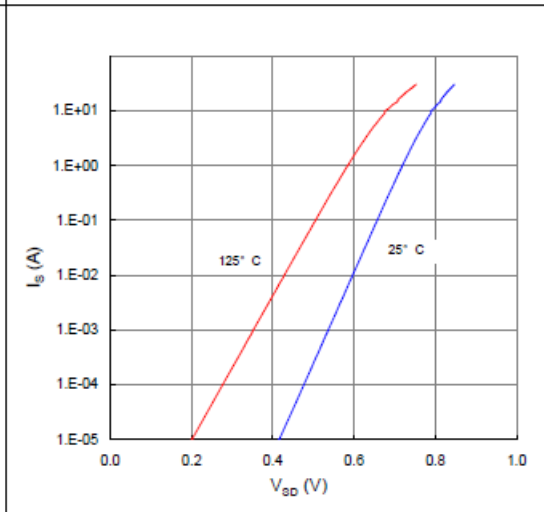


Figure 6. Typical Source-Drain Diode Forward Voltage





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TYPICAL CHARACTERISTICS

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

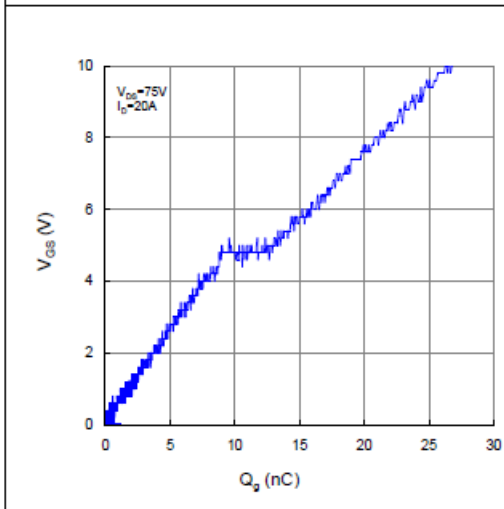


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

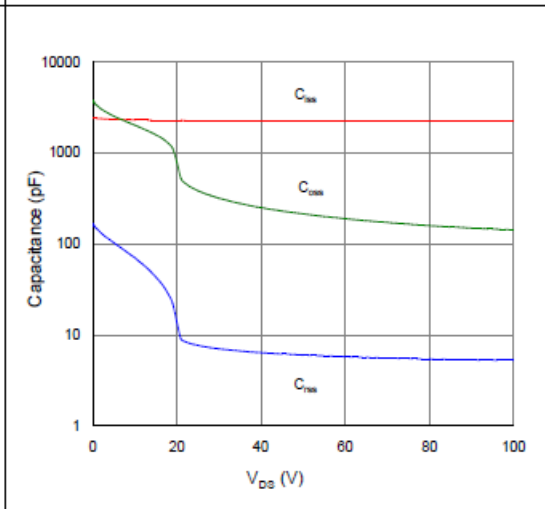


Figure 9. Maximum Safe Operating Area

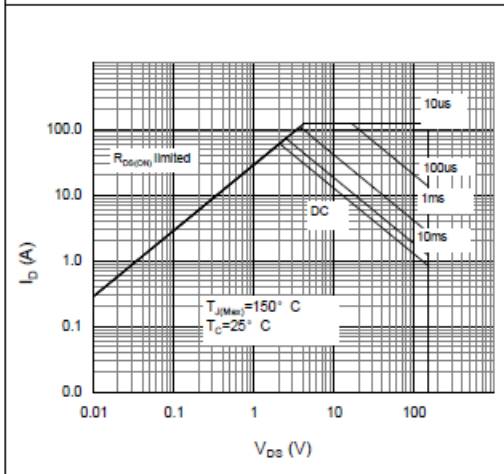


Figure 10. Maximum Drain Current vs. Case Temperature

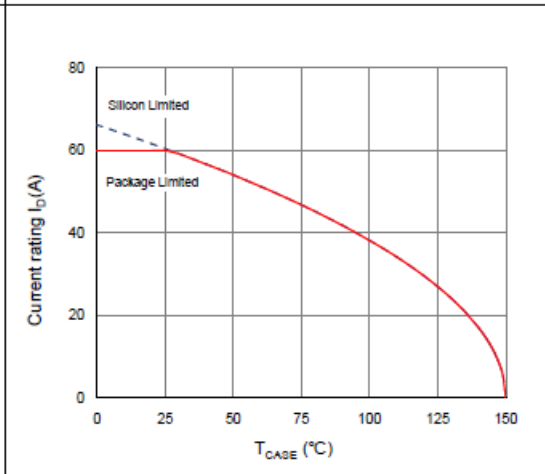
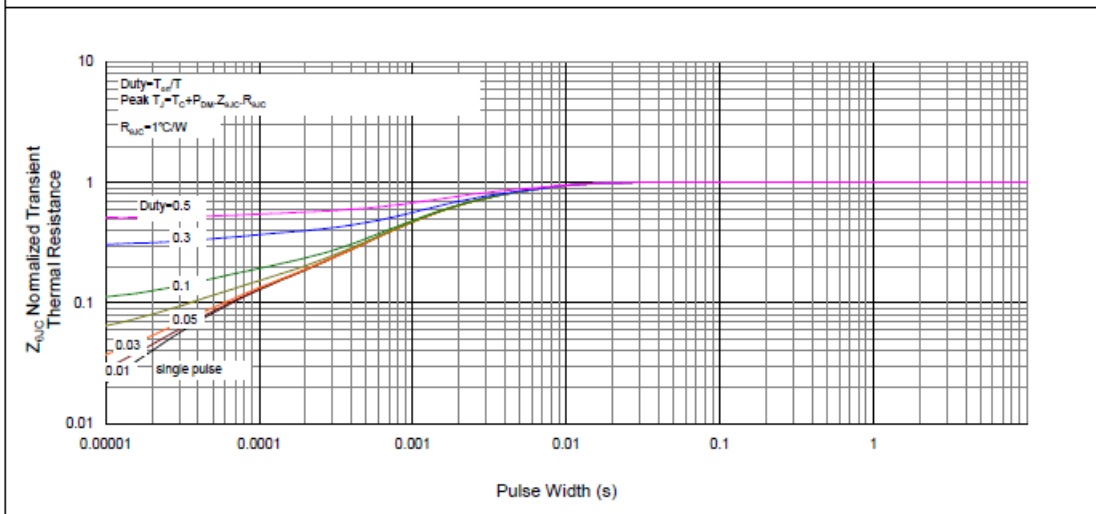


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case

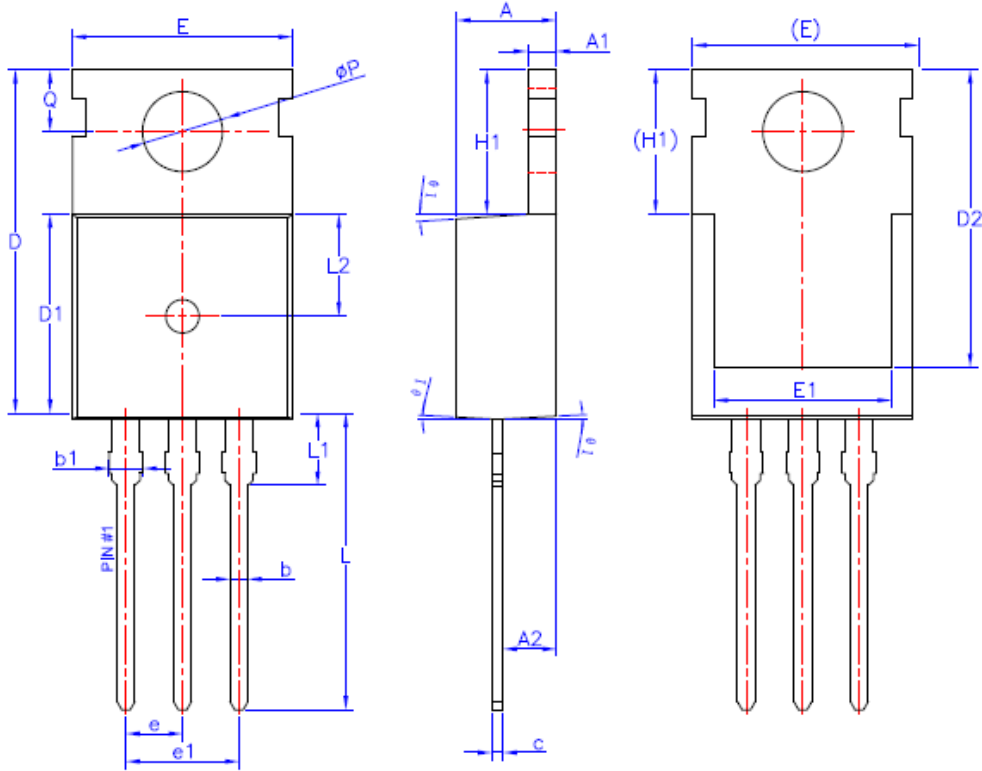




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TO-220-3L PACKAGE OUTLINE



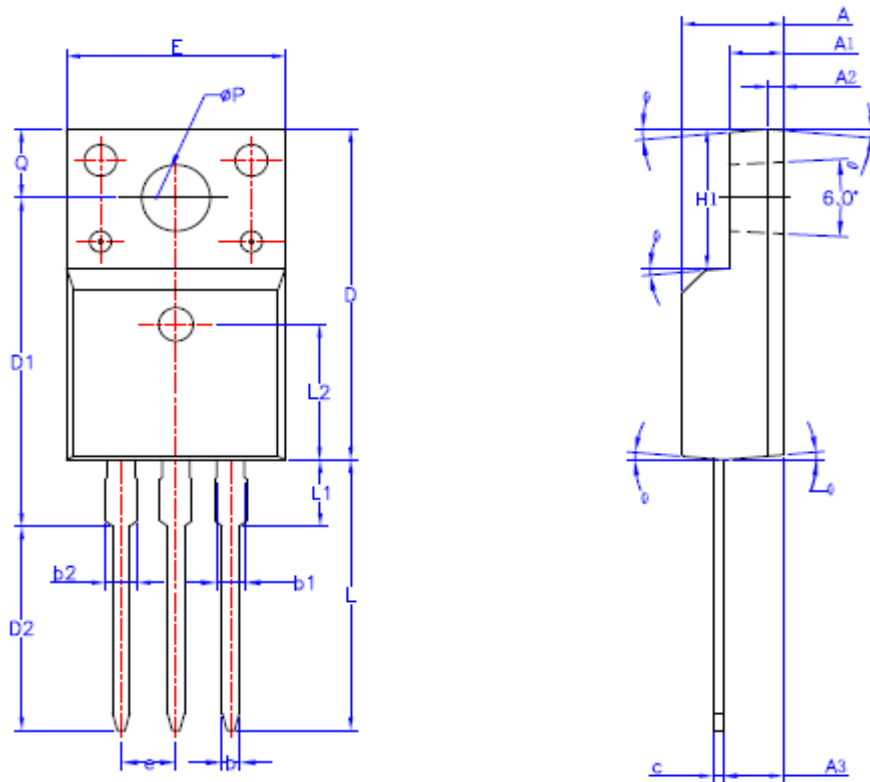
SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	—	0.90
b1	1.27	—	1.40
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	—	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.54BSC		
e1	5.08BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	—	—	3.50
L2	4.60REF		
φP	3.55	3.60	3.65
Q	2.73	—	2.87
#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	0.70 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		
ϕP	3.08	3.18	3.28
Q	3.20	—	3.40
$\theta 1$	1°	3°	5°



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