



SPN6098

N-Channel Enhancement Mode MOSFET

DESCRIPTION

The SPN6098 is the N-Channel logic enhancement mode power field effect transistors are produced using high cell density, DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for most of synchronous buck converter applications.

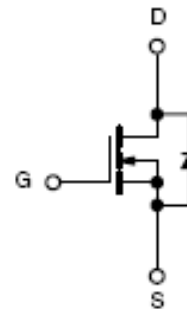
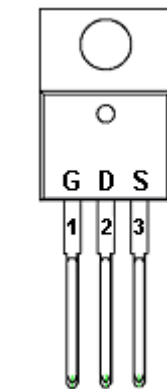
FEATURES

- ◆ 60V/60A, $R_{DS(ON)} = 12m\Omega @ V_{GS} = 10V$
- ◆ 60V/60A, $R_{DS(ON)} = 15.0m\Omega @ V_{GS} = 4.5V$
- ◆ Super high density cell design for extremely low $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-220-3L package design

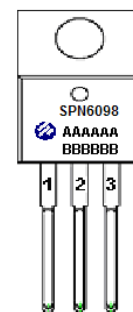
APPLICATIONS

- DC/DC Converter
- Load Switch
- Synchronous Buck Converter

PIN CONFIGURATION(TO-220-3L)



PART MARKING



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



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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
SPN6098T220TG	TO-220-3L	SPN6098
SPN6098T220TGB	TO-220-3L	SPN6098

※ SPN6098T220TG: Tube ; Pb – Free

※ SPN6098T220TGB: Tube ; Pb – Free; Halogen – Free

ABSOLUTE MAXIMUM RATINGS

($T_A=25^{\circ}\text{C}$ Unless otherwise noted)

Parameter	Symbol	Typical	Unit	
Drain-Source Voltage	V_{DSS}	60	V	
Gate –Source Voltage	V_{GSS}	± 20	V	
Continuous Drain Current($T_J=150^{\circ}\text{C}$)	I_D	$T_A=25^{\circ}\text{C}$	60	A
		$T_A=100^{\circ}\text{C}$	47	
Pulsed Drain Current	I_{DM}	120	A	
Avalanche Current	I_{AS}	38	A	
Power Dissipation	P_D	62	W	
Avalanche Energy with Single Pulse ($T_J=25^{\circ}\text{C}$, $L = 0.1\text{mH}$, $I_{AS} = 38\text{A}$, $V_{DD} = 25\text{V}$.)	E_{AS}	123	mJ	
Operating Junction Temperature	T_J	-55/150	$^{\circ}\text{C}$	
Storage Temperature Range	T_{STG}	-55/150	$^{\circ}\text{C}$	
Thermal Resistance-Junction to Ambient	$R_{\theta JA}$	62	$^{\circ}\text{C}/\text{W}$	



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ELECTRICAL CHARACTERISTICS

(T_A=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 =250μA	60			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0		2.5	
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			1	μA
		V _{DS} =48V, V _{GS} =0V T _J = 55 °C			5	
On-State Drain Current	I _{D(on)}	V _{DS} ≥5V, V _{GS} =10V	60			A
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 10V, I _D =15A		10	12	mΩ
		V _{GS} = 4.5V, I _D =10A		12	15	
Forward Transconductance	g _{fs}	V _{DS} =5V, I _D =15A		47		S
Diode Forward Voltage	V _{SD}	I _S =60A, V _{GS} =0V			1.2	V
Dynamic						
Total Gate Charge	Q _g	V _{DS} =48V, V _{GS} =4.5V I _D = 12A		24		nC
Gate-Source Charge	Q _{gs}			6.9		
Gate-Drain Charge	Q _{gd}			10		
Input Capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V f=1MHz		3200		pF
Output Capacitance	C _{oss}			210		
Reverse Transfer Capacitance	C _{rss}			145		
Turn-On Time	t _{d(on)}	V _{DD} =30V, I _D =2A, V _{GEN} =10V, R _G =3.3Ω		20		nS
	t _r			4		
Turn-Off Time	t _{d(off)}			84.5		
	t _f			6.5		



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TYPICAL CHARACTERISTICS

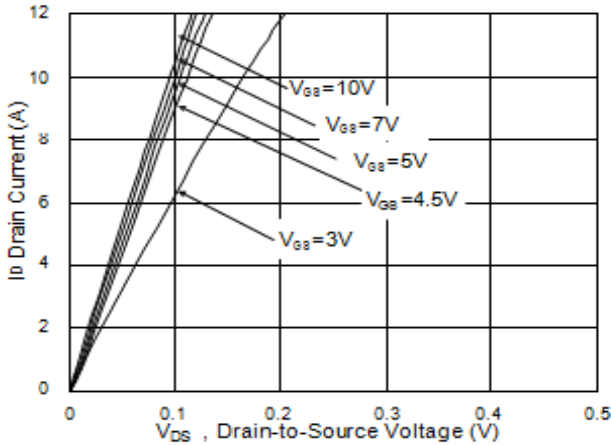


Fig. 1 Typical Output Characteristics

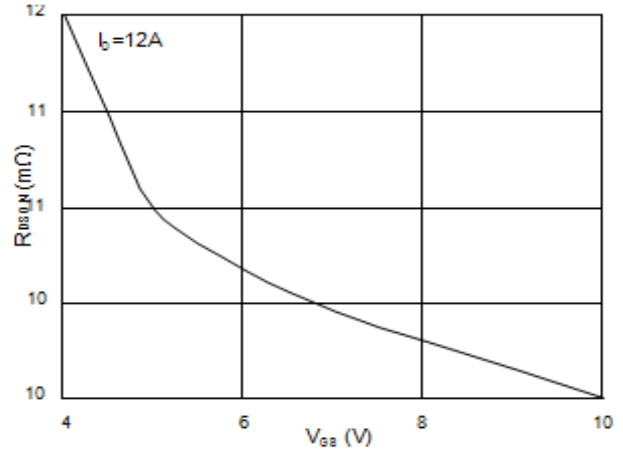


Fig. 2 On-Resistance vs. Gate Voltage

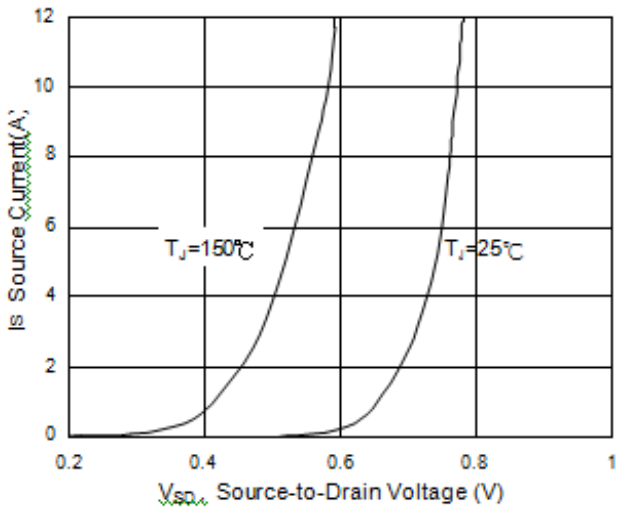


Fig. 3 Forward Characteristics
Reverse Diodes

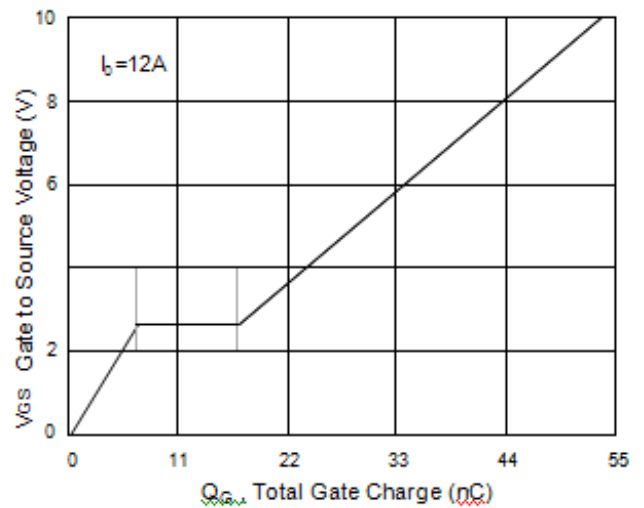


Fig. 4 Gate Charge Characteristics

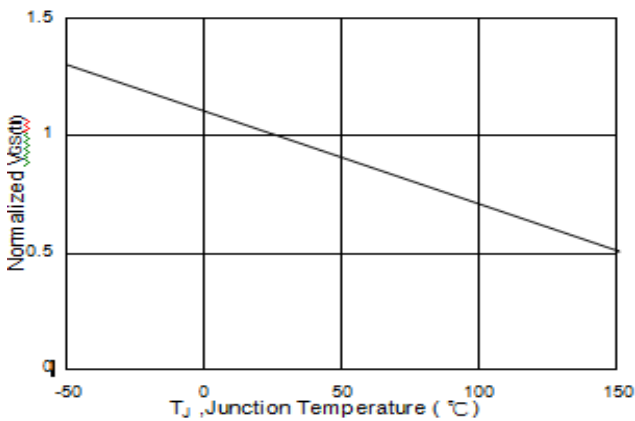


Fig. 5 Vgs vs. Junction Temperature

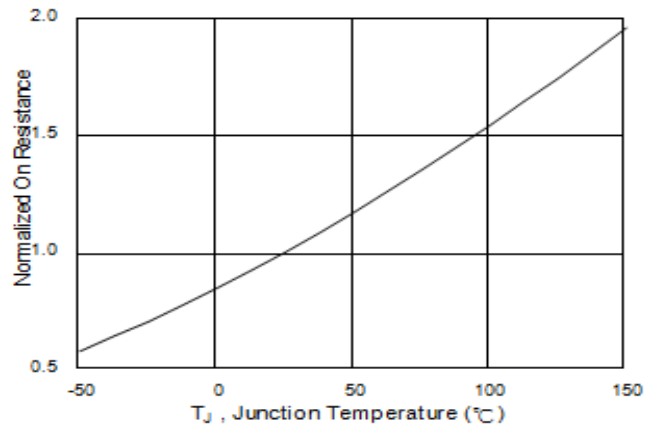


Fig. 6 On-Resistance vs. Temperature



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TYPICAL CHARACTERISTICS

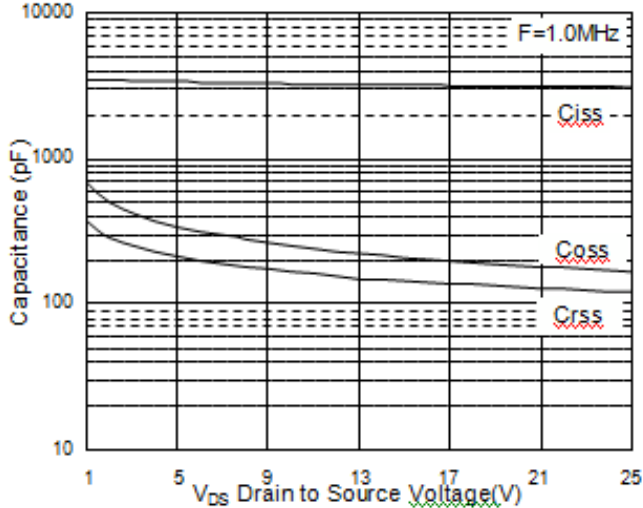


Fig. 7 Typical Capacitance Characteristics

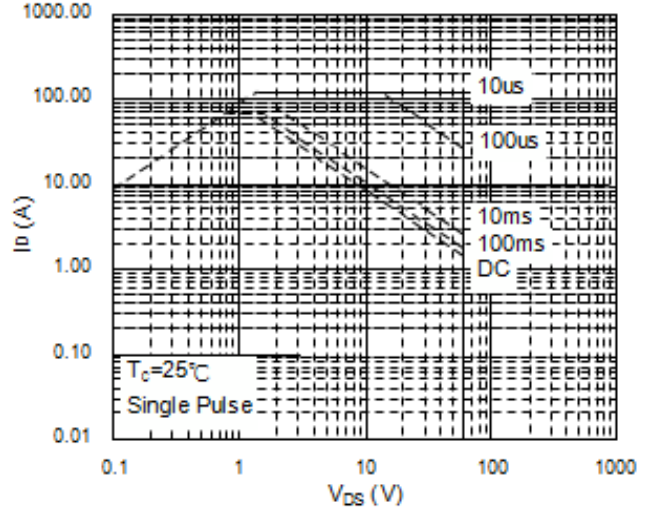


Fig. 8 Maximum Safe Operation Area

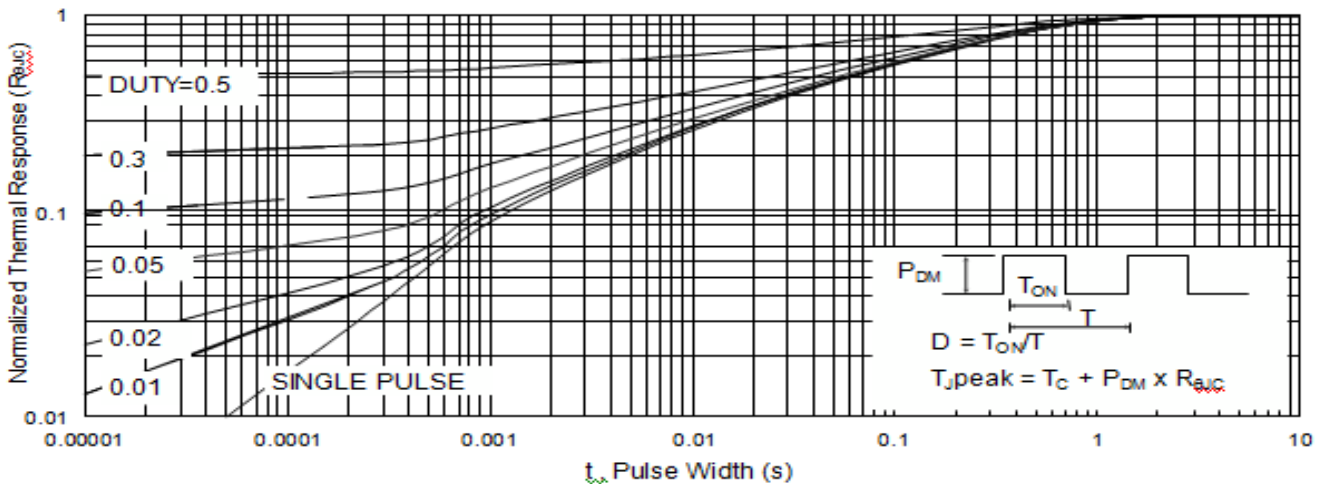


Fig. 9 Effective Transient Thermal Impedance

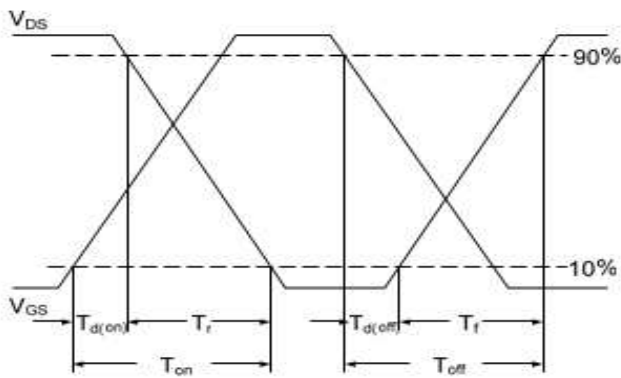


Fig. 10 Switching Time Waveform

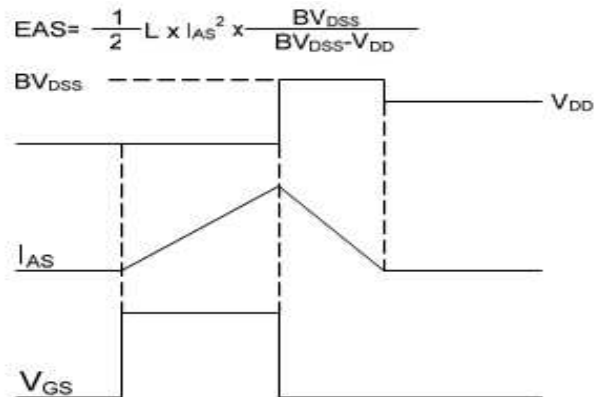


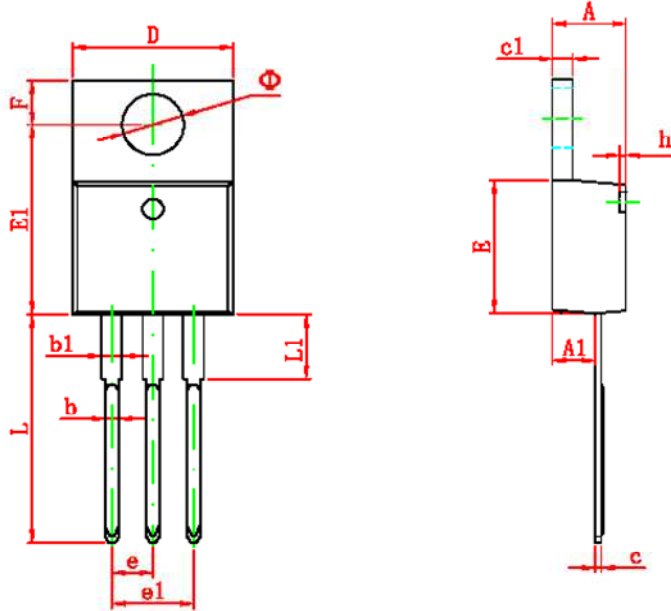
Fig. 11 Unclamped Inductive Waveform



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TO-220-3L PACKAGE OUTLINE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.470	4.670	0.176	0.184
A1	2.520	2.820	0.099	0.111
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
E1	12.060	12.460	0.475	0.491
e	2.540 TYP		0.100 TYP	
e1	4.980	5.180	0.196	0.204
F	2.590	2.890	0.102	0.114
h	0.000	0.300	0.000	0.012
L	13.400	13.800	0.528	0.543
L1	3.560	3.960	0.140	0.156
• •	3.735	3.935	0.147	0.155



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