



# SPN10T10 N-Channel Enhancement Mode MOSFET

## DESCRIPTION

The SPN10T10 is the N-Channel enhancement mode power field effect transistor which is produced using super high cell density DMOS trench technology. The SPN10T10 has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low  $R_{DS(ON)}$  and fast switching speed.

## APPLICATIONS

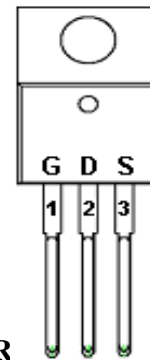
- Powered System
- DC/DC Converter
- Load Switch

## FEATURES

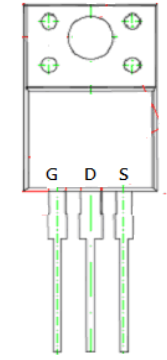
- ◆ 100V/5A,  $R_{DS(ON)}=160m\Omega@V_{GS}=10V$
- ◆ High density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-220-3L, TO-220F-3L package design

## PIN CONFIGURATION

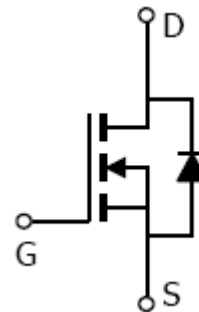
TO-220-3L



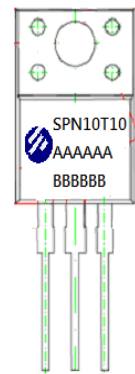
TO-220F-3L



PAR



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



A: Lot Code  
B: Date Code  
(YYMMDD)



# SPN10T10

## 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
SPN10T10T220TGB	TO-220-3L	SPN10T10
SPN10T10T220FTGB	TO-220F-3L	SPN10T10

※ SPN10T10T220TGB : Tube ; Pb – Free ; Halogen - Free

※ SPN10T10T220FTGB : Tube ; Pb – Free ; Halogen - Free

### ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit	
Drain-Source Voltage	V <sub>DSS</sub>	100	V	
Gate –Source Voltage	V <sub>GSS</sub>	±20	V	
Continuous Drain Current(T <sub>J</sub> =150°C)	I <sub>D</sub>	T <sub>C</sub> =25°C	9	A
		T <sub>C</sub> =100°C	5.6	
Pulsed Drain Current	I <sub>DM</sub>	30	A	
Avalanche Current	I <sub>AS</sub>	9	A	
Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25°C	28	W
		T <sub>C</sub> =100°C	10	
Operating Junction Temperature	T <sub>J</sub>	150	°C	
Storage Temperature Range	T <sub>STG</sub>	-55/150	°C	
Thermal Resistance-Junction to Ambient	R <sub>θJA</sub>	65	°C/W	



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### ELECTRICAL CHARACTERISTICS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	100			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1		3	V
Gate Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=80V, V_{GS}=0V$			25	uA
		$V_{DS}=80V, V_{GS}=0V$ $T_J=125^\circ C$			250	
On-State Drain Current	$I_{D(on)}$	$V_{DS}\geq 5V, V_{GS}=10V$	9			A
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=5A$		0.110	0.160	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_D=5A$		5.6		S
Diode Forward Voltage	$V_{SD}$	$I_S=9A, V_{GS}=0V$			1.3	V
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS}=80V, V_{GS}=10V$ $I_D=5A$		10	16	nC
Gate-Source Charge	$Q_{gs}$			2.5		
Gate-Drain Charge	$Q_{gd}$			4.5		
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V$ $f=1MHz$		430		pF
Output Capacitance	$C_{oss}$			56		
Reverse Transfer Capacitance	$C_{rss}$			35		
Turn-On Time	$t_{d(on)}$	$V_{DD}=50V, R_L=10\Omega$ $I_D=5A, V_{GEN}=10V$ $R_G=3.3\Omega$		6.5		nS
	$t_r$			10		
Turn-Off Time	$t_{d(off)}$			13		
	$t_f$			3.4		



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## TYPICAL CHARACTERISTICS

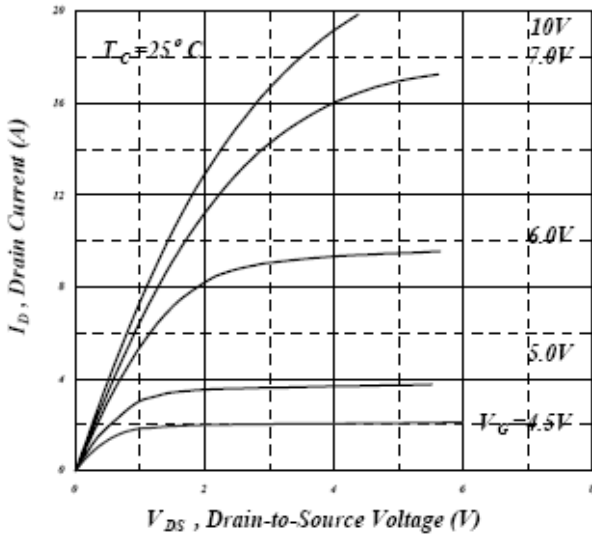


Fig 1. Typical Output Characteristics

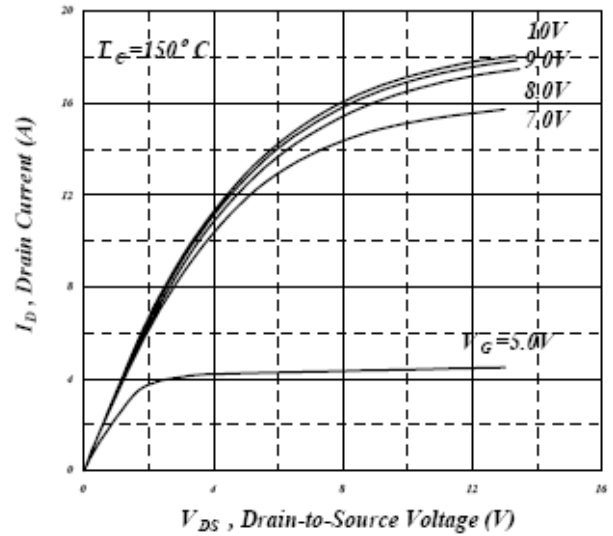


Fig 2. Typical Output Characteristics

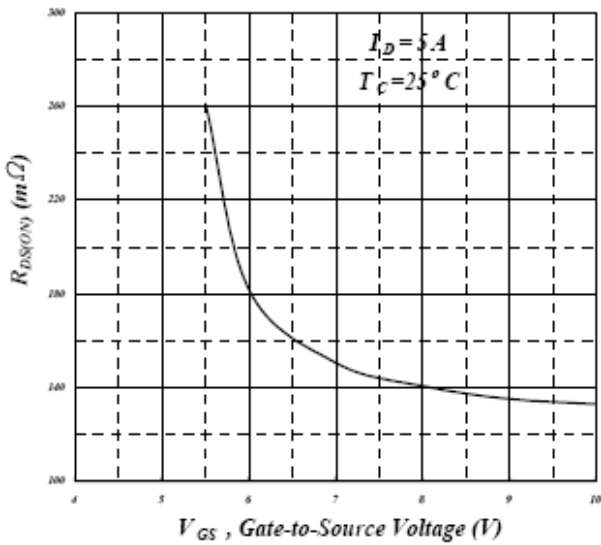


Fig 3. On-Resistance v.s. Gate Voltage

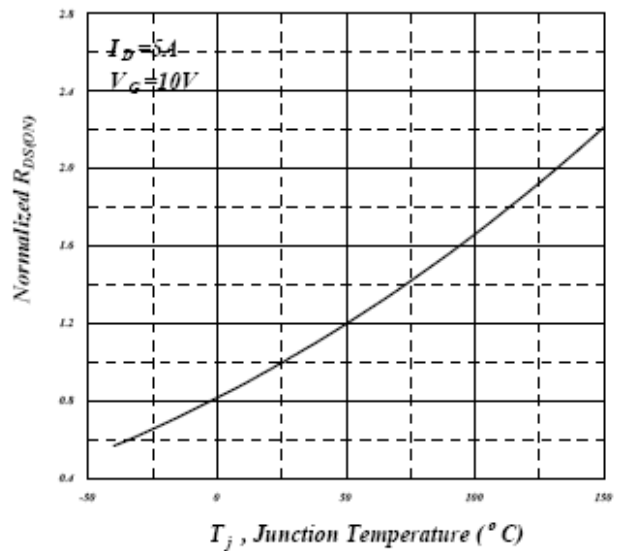


Fig 4. Normalized On-Resistance v.s. Junction Temperature



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## TYPICAL CHARACTERISTICS

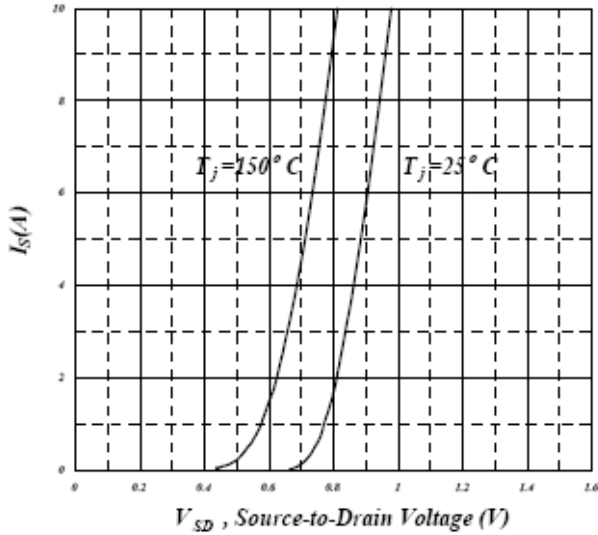


Fig 5. Forward Characteristic of Reverse Diode

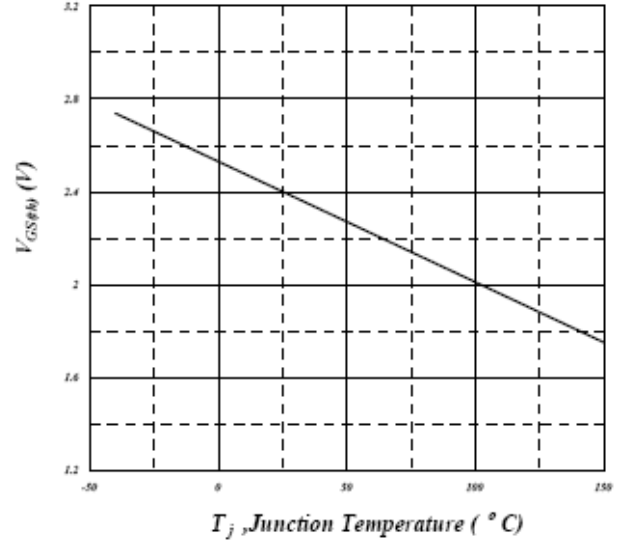


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

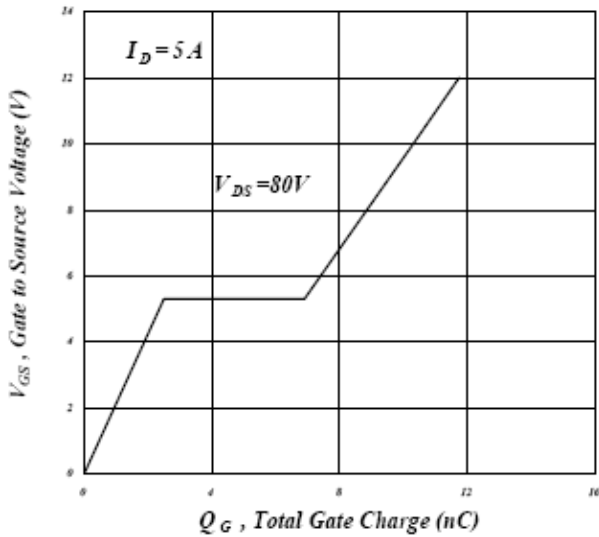


Fig 7. Gate Charge Characteristics

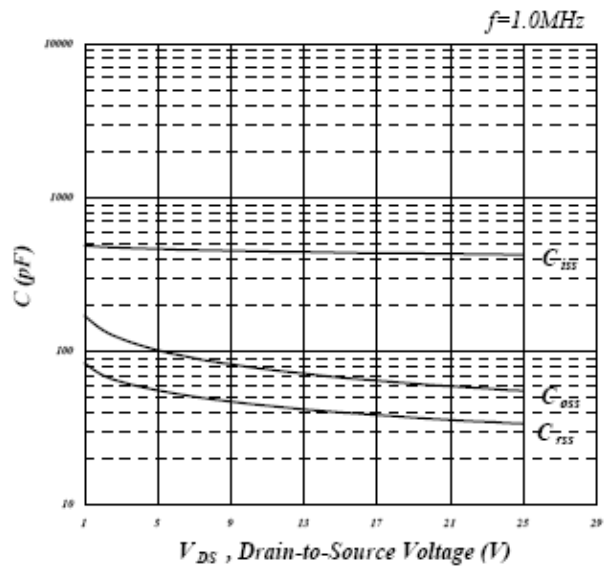


Fig 8. Typical Capacitance Characteristics



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## TYPICAL CHARACTERISTICS

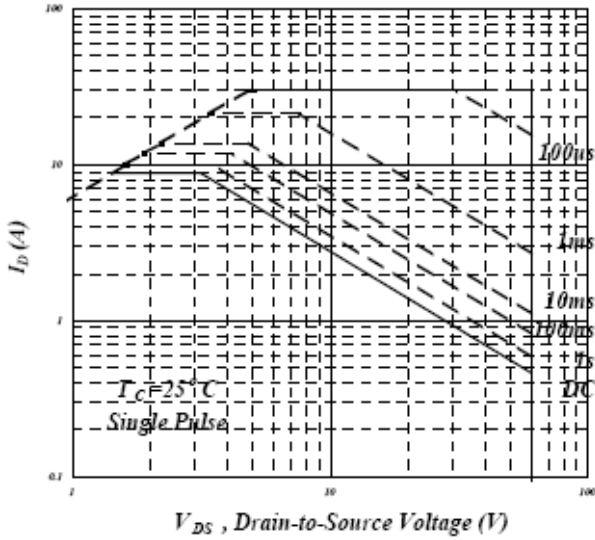


Fig 9. Maximum Safe Operating Area

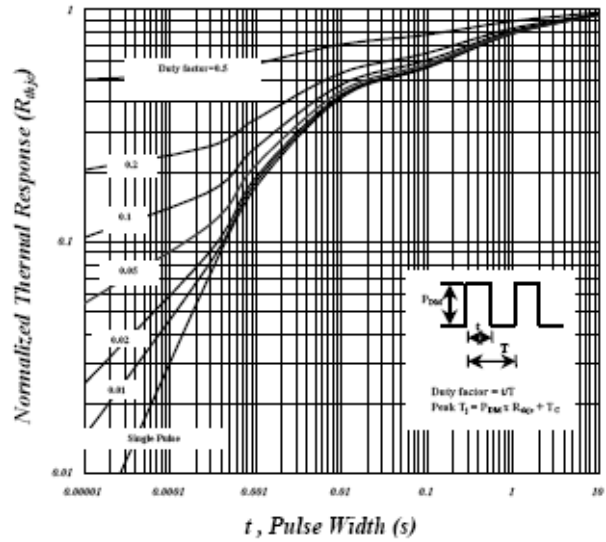


Fig 10. Effective Transient Thermal Impedance

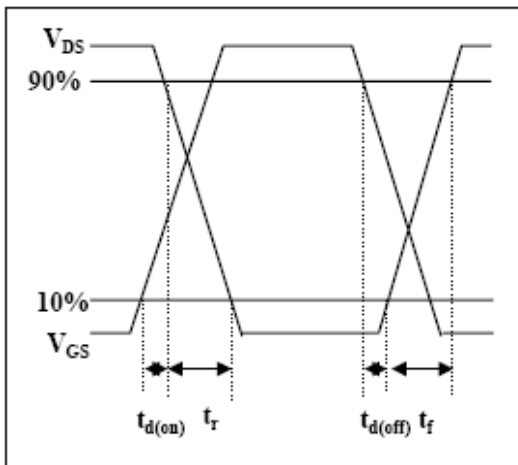


Fig 11. Switching Time Waveform

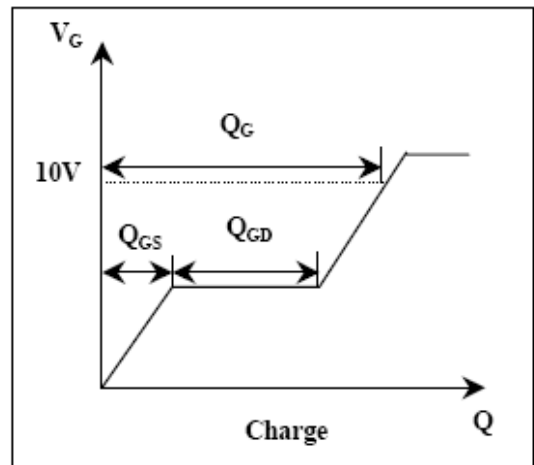


Fig 12. Gate Charge Waveform



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