



**N-Ch MOSFET** 

### **General Description**

WSR22N50F the silicon N-channel Enhanced VDMOSFETs, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-220F-3L, which accords with the RoHS standard.

#### Features

1) Low gate charge
2) Low Crss
3)Fast switching
4)100% avalanche tested
5)Improved dv/dt capability
6)RoHS product

### **Product Summery**

BV <sub>DSS</sub>	R <sub>DSON</sub>	Ι <sub>D</sub>
500V	250mΩ	20A

### Applications

Switching application

Power Management for Inverter Systems.

### TO-220F-3L Pin Configuration



### Absolute Maximum Ratings (TJ= 25 C unless otherwise specified)

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	V <sub>DS</sub> Drain-Source Voltage		V
V <sub>GS</sub>	Gate-Source Voltage	±30	V
-	Continuous Drain Current	20	A
ID	Continuous Drain Current TC = 100 °C	13	A
I <sub>DM</sub>	Pulsed Drain Current <sup>a</sup>	80	A
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>b</sup>	1500	mJ
E <sub>AR</sub>	Avalanche Energy ,Repetitive	90	A
Pa	Power Dissipation	113	W
I D	Derating Factor above 25°C	1.84	W/°C
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	Ĉ
T <sub>J</sub> Operating Junction Temperature Range		150	°C

#### **Thermal Data**

Symbol	Parameter	Тур.	Max.	Unit	
R <sub>eja</sub>	Junction-to-Ambient		62.5	°C/W	
R <sub>θJC</sub>	Junction-to-Case		1.1	°C/W	



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# Electrical Characteristics (T\_J=25 $\,{}^\circ\!\!\!C$ , unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Тур.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =250uA	Í€€			V
$\triangle BV_{DSS} / \triangle T_J$	BV <sub>DSS</sub> Temperature Coefficient	ID=250uA,Reference25 <sup>°</sup> C		0.55		V/℃
R <sub>DS(ON)</sub>	Drain-to-Source On-Resistance	V <sub>GS</sub> =10V,I <sub>D</sub> =10A		250	300	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage		2.0	3.0	4È€	V
$ riangle V_{GS(th)}$	V <sub>GS(th)</sub> Temperature Coefficient	$\nabla_{GS} = \nabla_{DS}$ , $D = 2500A$		-5.5		mV/℃
	Drain-Source Leakage Current	$V_{DS}$ =500V , $V_{GS}$ =0V , T <sub>J</sub> =25 $^{\circ}$ C			1	
IDSS		$V_{DS}$ =500V , $V_{GS}$ =0V , $T_{J}$ =55 $^{\circ}$ C			10	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	$V_{GS}=\pm30V$ , $V_{DS}=0V$			±100	nA
Qg	Total Gate Charge (10V)			63		
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =250V , V <sub>GS</sub> =10V , I <sub>D</sub> =10A		15		nC
Q <sub>gd</sub>	Gate-Drain Charge			22		
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =250V ,		30		
Tr	Rise Time	V <sub>GS</sub> =10V ,		71		
T <sub>d(off)</sub>	Turn-Off Delay Time	R <sub>G</sub> =25Ω,		80		ns
T <sub>f</sub>	Fall Time	I <sub>D</sub> =10A		170		
C <sub>iss</sub>	Input Capacitance			2800		
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =25V , V <sub>GS</sub> =0V , f=1MHz		285		pF
Crss	Reverse Transfer Capacitance			25		

### **Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Тур.	Max.	Unit
l <sub>S</sub> ℃	Continuous Source Current (Body Diode)				20	А
I <sub>SM</sub>	Maximum Pulsed Current (Body Diode)				80	А
$V_{SD}$	Diode Forward Voltage <sup>2</sup> $V_{GS}$ =0V , I <sub>S</sub> =20A , T <sub>J</sub> =25 $^{\circ}$ C				1.5	V
t <sub>rr</sub>	Reverse Recovery Time			390		nS
Qrr	Reverse Recovery Charge	1F=20A,αl/αt=100A/μs,1j=25 C		3350		nC

a:Repetitive rating; pulse width limited by maximum junction temperature

b:L=10.0mH, I<sub>D</sub>=17.3A, Start T<sub>J</sub>=25℃

 $c:I_{SD}$  =20A,di/dt ≤300A/us,V<sub>DD</sub>≤BV<sub>DS</sub>, Start T<sub>J</sub>=25 °C



## **Typical Operating Characteristics**



**Power Dissipation** 



## **Thermal Transient Impedance**

**Drain Current** 22 32 28 18 Ip-Drain Current (A) Ip-Drain Current (A) 24 12 20 9 16 12 4 8 2 4 T\_=25°C,V\_=10V 0 0 80 100 120 140 160 40 60 0 20 0 T<sub>j</sub>-Junction Temperature (°C)

**Output Characteristics** 







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## **Typical Operating Characteristics**



### Capacitance



#### Source-Drain Diode Forward









## **Typical Operating Characteristics**



### Transfer Characteristics



### **BVDSS vs Junction Temperature**



#### Gate Threshold Voltage







WSR22N50F

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# Packaging information







S Y	TO-220F-3L				
M B	MILLIMETERS		INCHES		
O L	MIN.	MAX.	MIN.	MAX.	
Α	4.20	4.80	0.165	0.189	
A1	2.34	3.20	0.092	0.126	
A2	2.10	2.90	0.083	0.114	
b	0.50	0.90	0.020	0.035	
b2	0.91	1.90	0.035	0.075	
С	0.30	0.80	0.012	0.031	
D	8.10	9.40	0.319	0.370	
d1	14.50	16.50	0.571	0.650	
d2	12.10	12.90	0.476	0.508	
Е	9.70	10.70	0.382	0.421	
е	2.54 BSC		0.10	0 BSC	
L	13.00	14.50	0.512	0.570	
L1	1.60	4.00	0.063	0.157	
Р	3.00	3.60	0.118	0.142	

# **RECOMMENDED LAND PATTERN**



UNIT: mm



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