

### 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, which accords with the RoHS standard.

### Features

- Low gate charge
- Low Crss
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- RoHS product

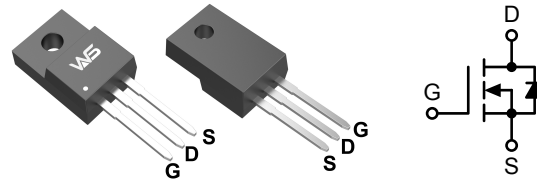
### Product Summary

$BV_{DSS}$	$R_{DSON}$	$I_D$
500V	250mΩ	20A

### Applications

- Switching application.
- Power Management for Inverter Systems.

### TO-220F Pin Configuration



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Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	500	V
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$I_D$	Continuous Drain Current	20	A
	Continuous Drain Current TC = 100 °C	13	A
$I_{DM}$	Pulsed Drain Current <sup>a</sup>	80	A
$E_{AS}$	Single Pulse Avalanche Energy <sup>b</sup>	1500	mJ
$E_{AR}$	Avalanche Energy ,Repetitive	90	A
$P_D$	Power Dissipation	113	W
	Derating Factor above 25°C	1.84	W/°C
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	150	°C

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Junction-to-Ambient	---	62.5	°C/W
$R_{\theta JC}$	Junction-to-Case	---	1.1	°C/W

**Electrical Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	—	—	—	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	$I_D=250\mu A, \text{Reference } 25^\circ C$	—	0.55	—	V/ $^\circ C$
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=10A$	—	250	300	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	2.0	—	4.0	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		—	-5.5	—	mV/ $^\circ C$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=500V, V_{GS}=0V, T_J=25^\circ C$	—	—	1	$\mu A$
		$V_{DS}=500V, V_{GS}=0V, T_J=55^\circ C$	—	—	10	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$	—	—	$\pm 100$	nA
$Q_g$	Total Gate Charge (10V)	$V_{DS}=250V, V_{GS}=10V, I_D=10A$	—	63	—	nC
$Q_{gs}$	Gate-Source Charge		—	15	—	
$Q_{gd}$	Gate-Drain Charge		—	22	—	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=250V, V_{GS}=10V, R_G=25\Omega, I_D=10A$	—	30	—	ns
$T_r$	Rise Time		—	71	—	
$T_{d(off)}$	Turn-Off Delay Time		—	170	—	
$T_f$	Fall Time		—	80	—	
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1MHz$	—	2800	—	pF
$C_{oss}$	Output Capacitance		—	285	—	
$C_{rss}$	Reverse Transfer Capacitance		—	25	—	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S^c$	Continuous Source Current (Body Diode)	$V_G=V_D=0V, \text{Force Current}$	—	—	20	A
$I_{SM}$	Maximum Pulsed Current (Body Diode)		—	—	80	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=20A, T_J=25^\circ C$	—	—	1.5	V
$t_{rr}$	Reverse Recovery Time	$I_F=20A, di/dt=100A/\mu s, T_J=25^\circ C$	—	390	—	nS
$Q_{rr}$	Reverse Recovery Charge		—	3350	—	nC

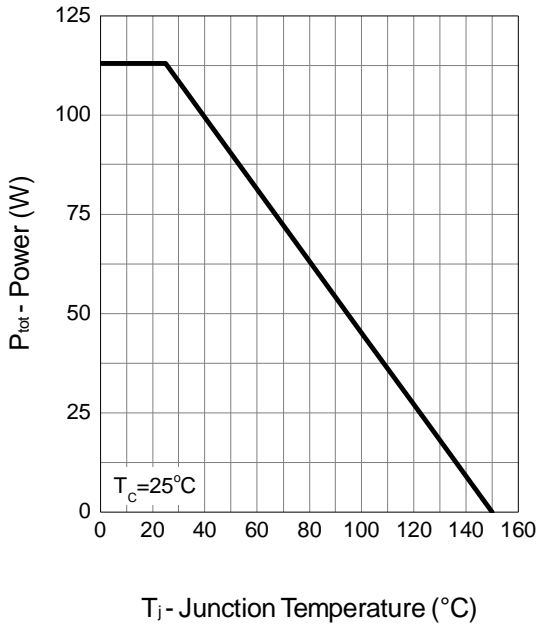
a: Repetitive rating; pulse width limited by maximum junction temperature

b: L=10.0mH,  $I_D=17.3A$ , Start  $T_J=25^\circ C$

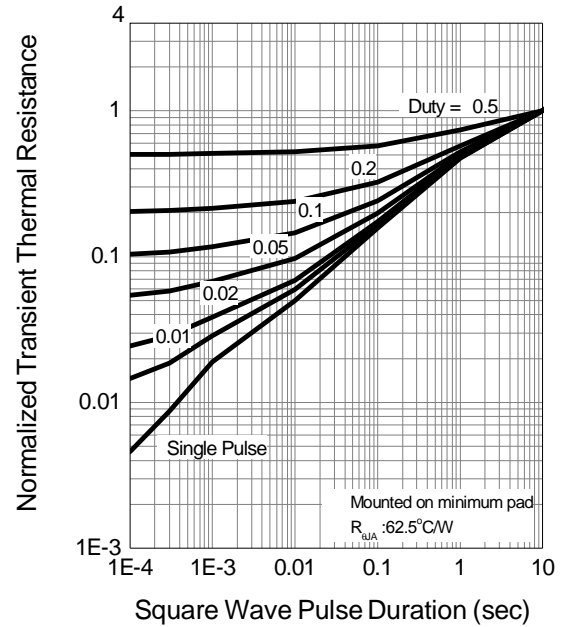
c:  $I_{SD}=20A, di/dt \leq 300A/\mu s, V_{DD} \leq BV_{DS}$ , Start  $T_J=25^\circ C$

Typical Characteristics

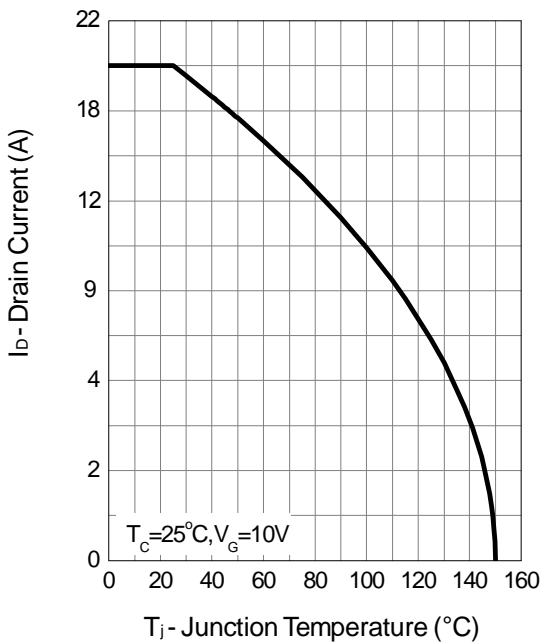
Power Dissipation



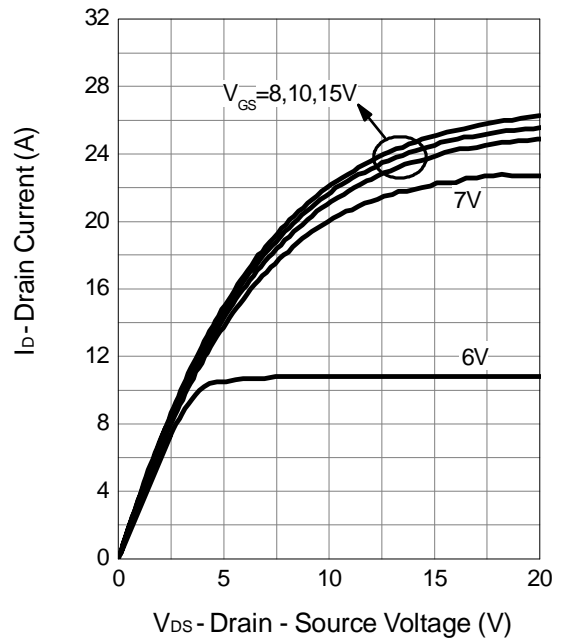
Thermal Transient Impedance



Drain Current

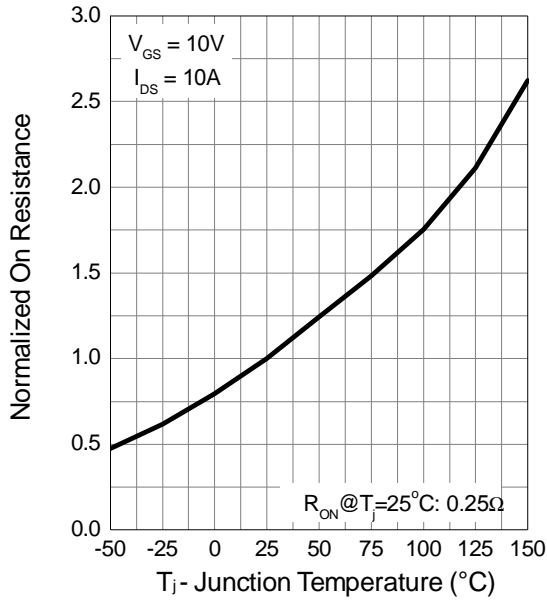


Output Characteristics

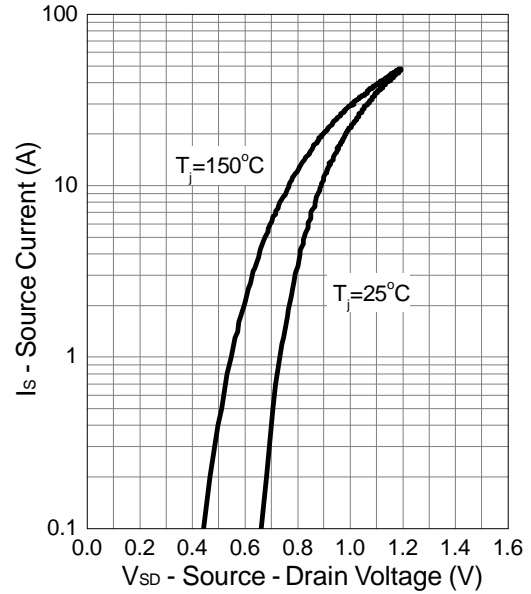


Typical Characteristics (Cont.)

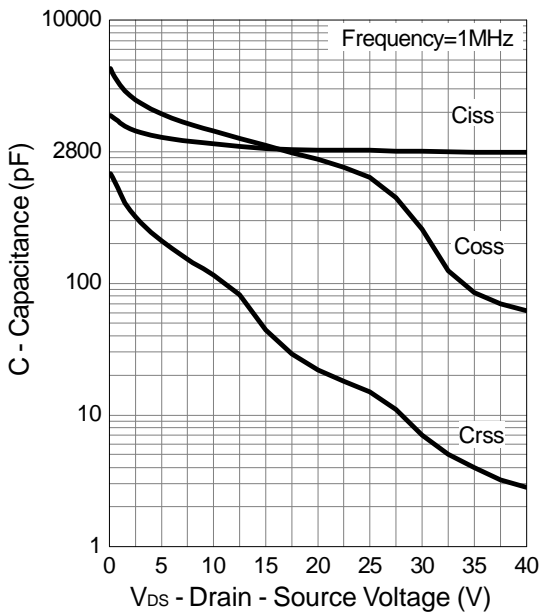
Drain-Source On Resistance



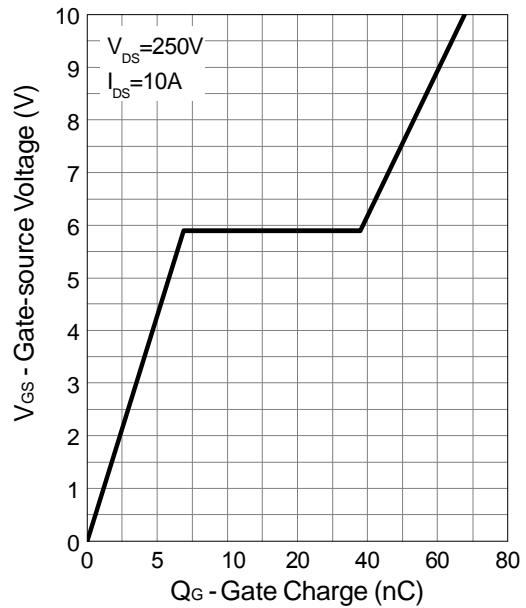
Source-Drain Diode Forward



Capacitance

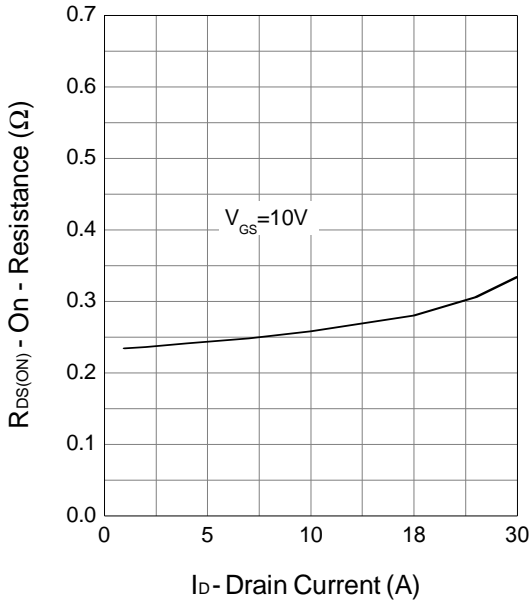


Gate Charge

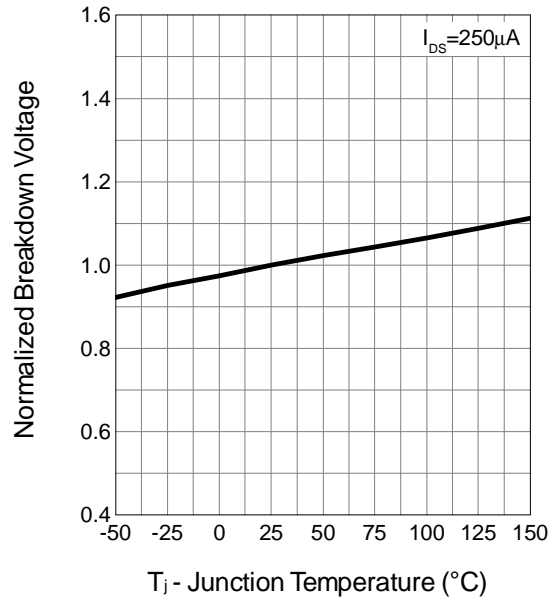


Typical Characteristics (Cont.)

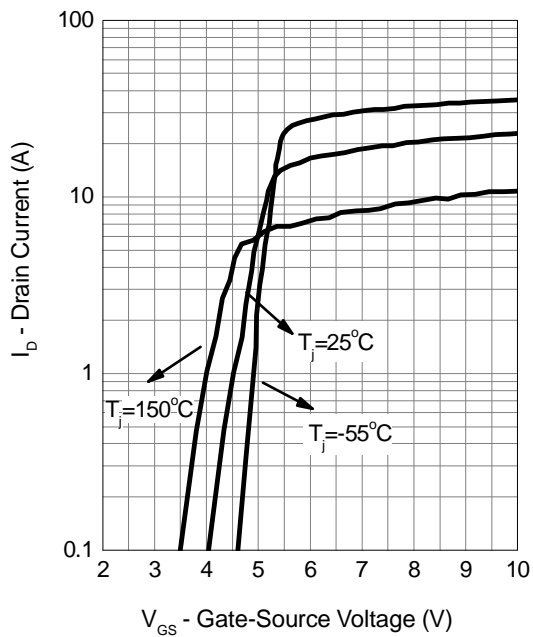
Drain-Source On Resistance



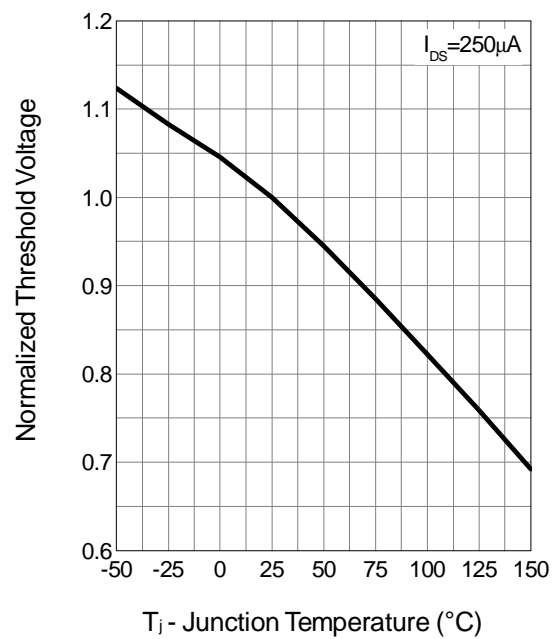
BVDSS vs Junction Temperature

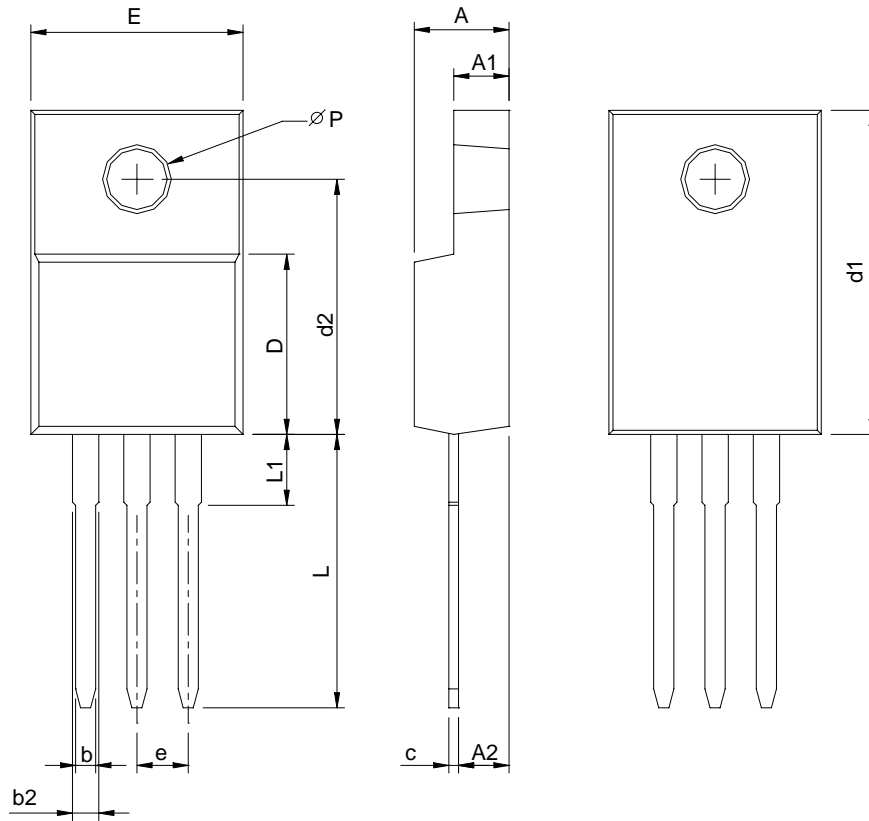


Transfer Characteristics

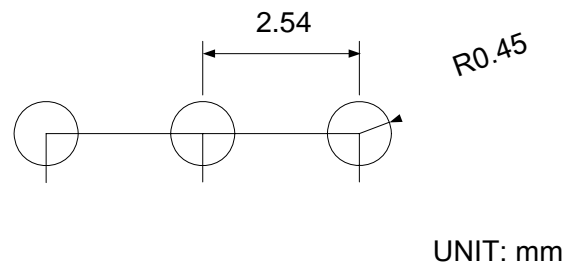


Gate Threshold Voltage



**Packaging information**


SYMBOL	TO-220F			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	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
c	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
E	9.70	10.70	0.382	0.421
e	2.54 BSC		0.100 BSC	
L	13.00	14.50	0.512	0.570
L1	1.60	4.00	0.063	0.157
P	3.00	3.60	0.118	0.142

**RECOMMENDED LAND PATTERN**




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