

## General Description

The WSF5N50 is 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.

## Features

- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Green Device Available

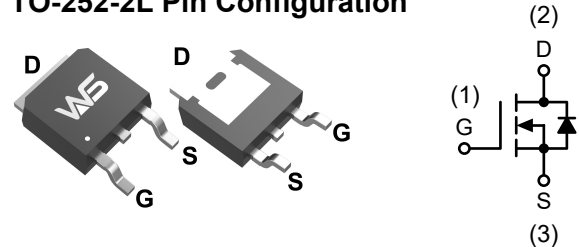
## Product Summary

BVDSS	RDSON	ID
500V	1250mΩ	5A

## Applications

- Uninterruptible Power Supply(UPS)
- Power Factor Correction (PFC)

## TO-252-2L Pin Configuration



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	500	V
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	5	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	2	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	25	A
EAS	Single Pulse Avalanche Energy	88	mJ
$P_D@T_C=25^\circ C$	Total Power Dissipation	65.8	W
$P_D@T_C=100^\circ C$	Total Power Dissipation	26.3	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

## Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	---	62.5	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	5.0	$^\circ C/W$

**Electrical Characteristics (T<sub>J</sub>=25 °C unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	500	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.25	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =2.5A	---	1250	1500	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	2.5	3.5	4.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-4.64	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =400V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =400V, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C	---	---	200	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =30V, I <sub>D</sub> =2.5A	---	5.2	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	4.2	---	Ω
Q <sub>g</sub>	Total Gate Charge (10V)	V <sub>DS</sub> =480V, V <sub>GS</sub> =10V, I <sub>D</sub> =2A	---	12.5	16.3	nC
Q <sub>gs</sub>	Gate-Source Charge		---	3.3	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	4.5	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =400V, V <sub>GS</sub> =10V, R <sub>G</sub> =100Ω, I <sub>D</sub> =4A.	---	8.5	---	ns
T <sub>r</sub>	Rise Time		---	20	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	16	---	
T <sub>f</sub>	Fall Time		---	16	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	---	655	780	pF
C <sub>oss</sub>	Output Capacitance		---	50	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	13	---	

**Diode Characteristics**

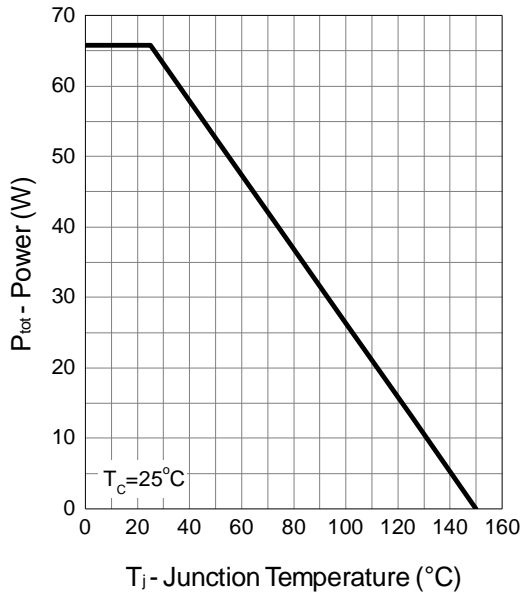
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	5	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>		---	---	25	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =4A, T <sub>J</sub> =25°C	---	0.96	1.3	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =4A, di/dt=100A/μs, T <sub>J</sub> =25°C	---	132	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	0.75	---	uC

Note :

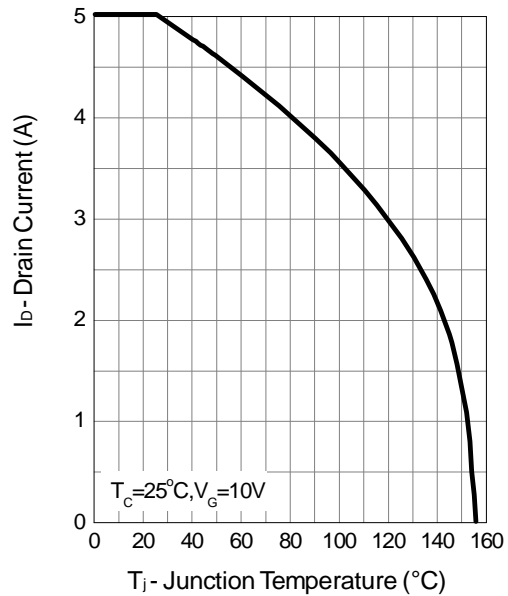
- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper,t<10sec.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°C junction temperature
- 4.The Min. value is 100% EAS tested guarantee.
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

**Typical Characteristics**

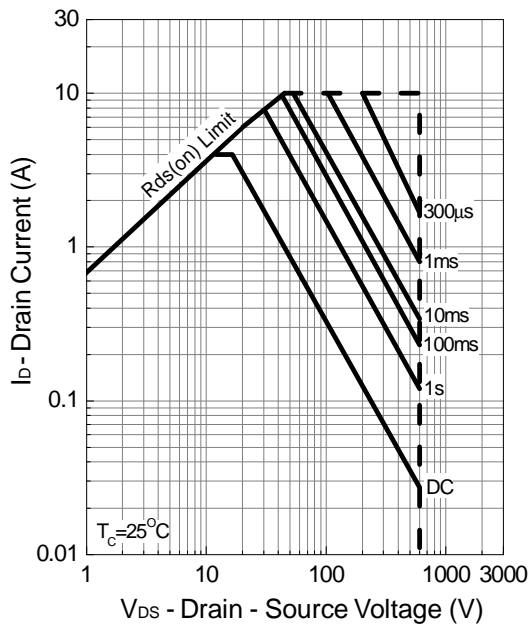
**Power Dissipation**



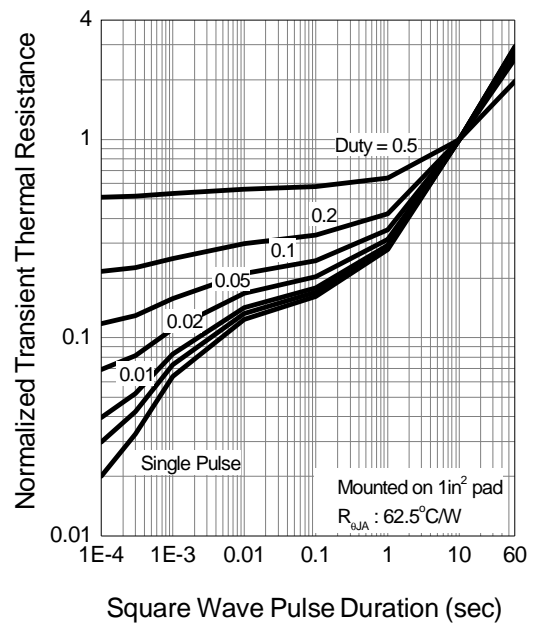
**Drain Current**



**Safe Operation Area**

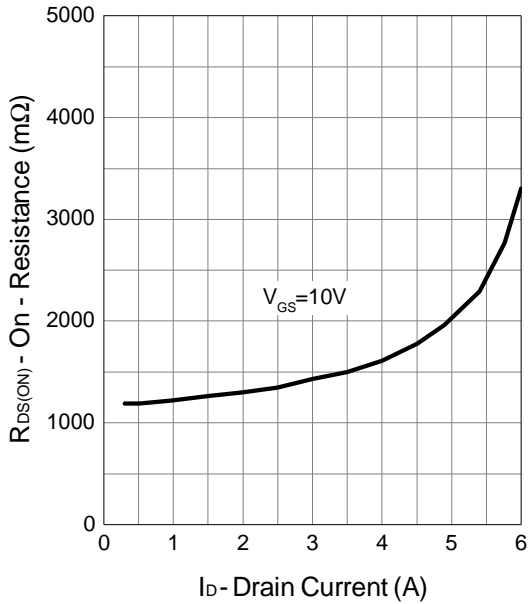


**Thermal Transient Impedance**

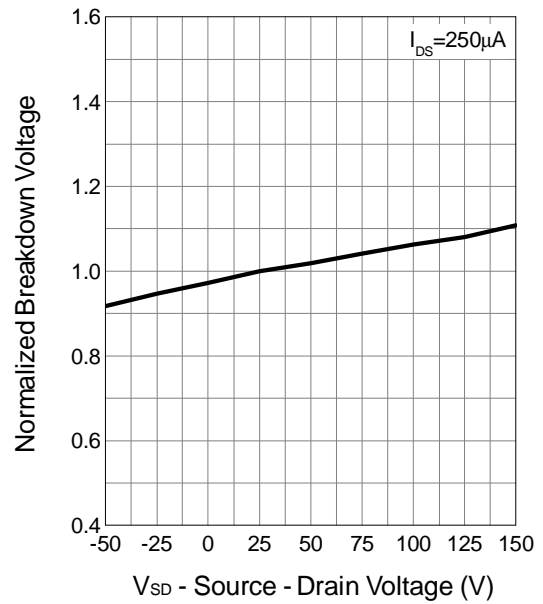


Typical Characteristics (Cont.)

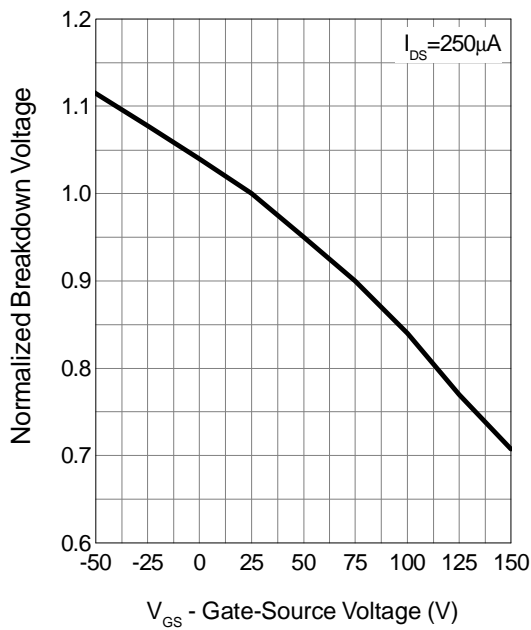
Drain-Source On Resistance



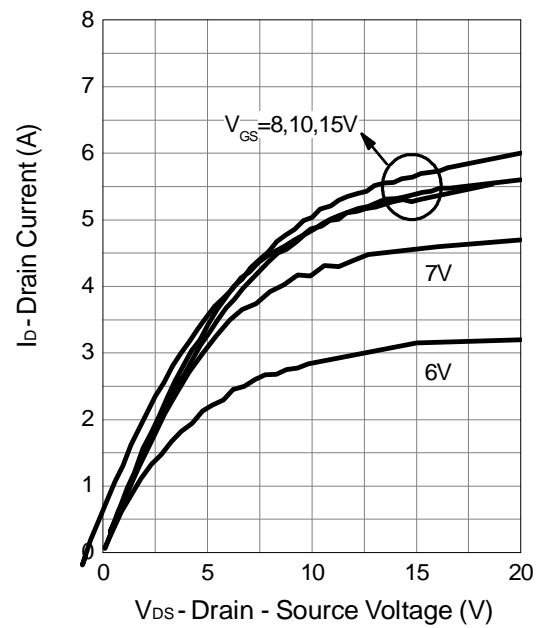
BVDSS vs Junction Temperature



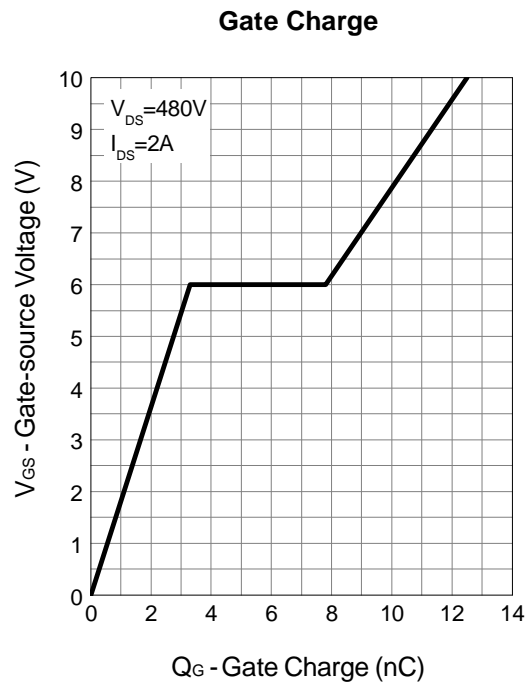
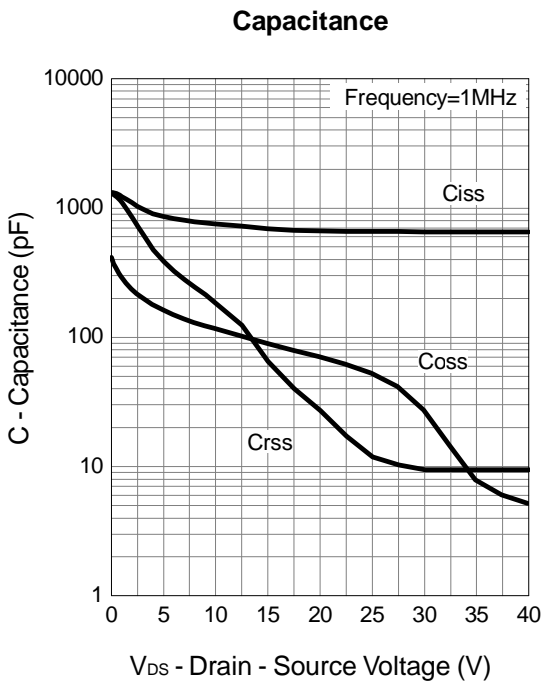
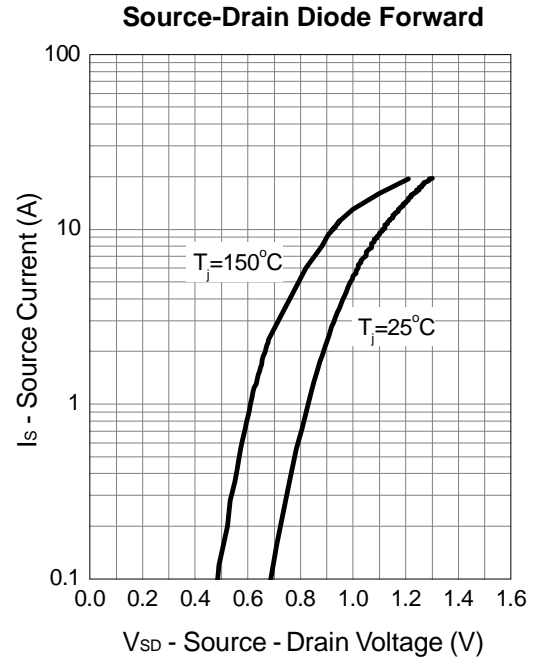
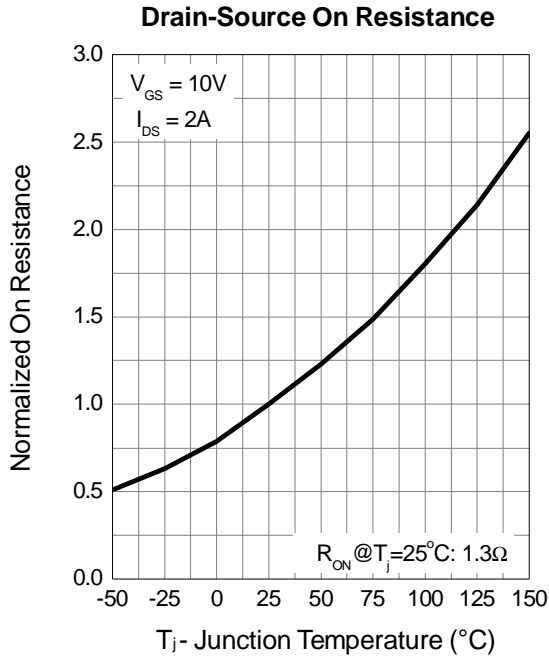
$V_{GS(th)}$  vs Junction Temperature

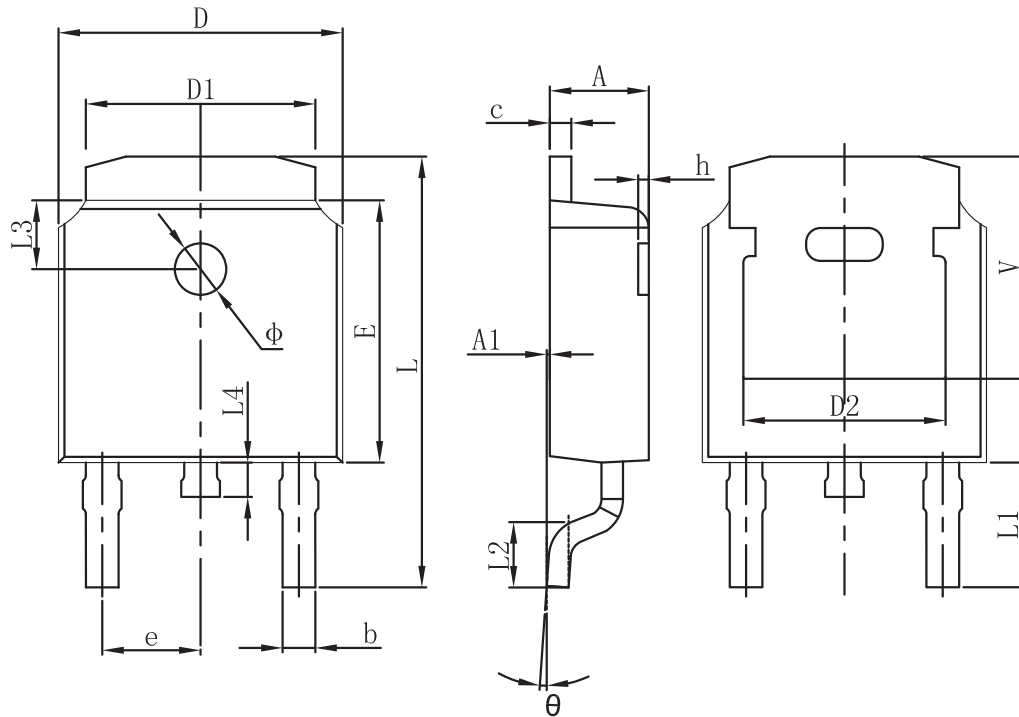


Output Characteristics



Typical Characteristics (Cont.)



**Packaging information**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	



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