

General Description

The WSF50N10 is the highest performance trench N-Ch MOSFET with extreme high cell density, which provide excellent R_{DS(on)} and gate charge for most of the synchronous buck converter applications.

The WSF50N10 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent C_{dv/dt} effect decline
- Green Device Available

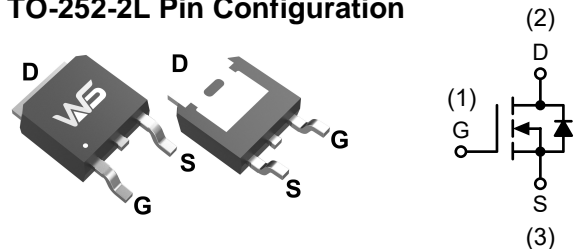
Product Summary

BV _{DSS}	R _{DS(on)}	I _D
100V	22mΩ	50A

Applications

- High Frequency Point-of-Load Synchronous Buck Converter
- Networking DC-DC Power System
- Load Switch

TO-252-2L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	100	V
V _{GS}	Gate-Source Voltage	±20	V
I _D @T _C =25°C	Continuous Drain Current, V _{GS} @ 10V ¹	50	A
I _D @T _C =100°C	Continuous Drain Current, V _{GS} @ 10V ¹	25	A
I _D @T _A =25°C	Continuous Drain Current, V _{GS} @ 10V ¹	6.7	A
I _D @T _A =70°C	Continuous Drain Current, V _{GS} @ 10V ¹	5.3	A
I _{DM}	Pulsed Drain Current ²	160	A
EAS	Single Pulse Avalanche Energy ³	81	mJ
I _{AS}	Avalanche Current	18	A
P _D @T _C =25°C	Total Power Dissipation ⁴	83	W
P _D @T _A =25°C	Total Power Dissipation ⁴	33	W
T _{STG}	Storage Temperature Range	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction-ambient ¹	---	50	°C/W
R _{θJC}	Thermal Resistance Junction-Case ¹	---	1.5	°C/W

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	100	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BVDSS Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	0.098	---	V/ $^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=20A$	---	22	28	$m\Omega$
		$V_{GS}=4.5V, I_D=15A$	---	24	32	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	2.0	3.0	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.52	---	mV/ $^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=80V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	10	μA
		$V_{DS}=80V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	100	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=5V, I_D=20A$	---	25.7	---	S
R_g	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	1.0	1.2	Ω
Q_g	Total Gate Charge (10V)	$V_{DS}=30V, V_{GS}=10V, I_D=20A$	---	50	65	nC
Q_{gs}	Gate-Source Charge		---	8	14	
Q_{gd}	Gate-Drain Charge		---	10	18	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=30V, V_{GS}=10V, I_D=20A$	---	9	17	ns
T_r	Rise Time		---	18	33	
$T_{d(off)}$	Turn-Off Delay Time		---	14	26	
T_f	Fall Time		---	56	101	
C_{iss}	Input Capacitance	$V_{DS}=30V, V_{GS}=0V, f=1\text{MHz}$	---	2450	3180	pF
C_{oss}	Output Capacitance		---	150	192	
C_{rss}	Reverse Transfer Capacitance		---	85	115	

Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy ⁵	$V_{DD}=25V, L=0.1\text{mH}, I_{AS}=18A$	80	---	---	mJ

Diode Characteristics

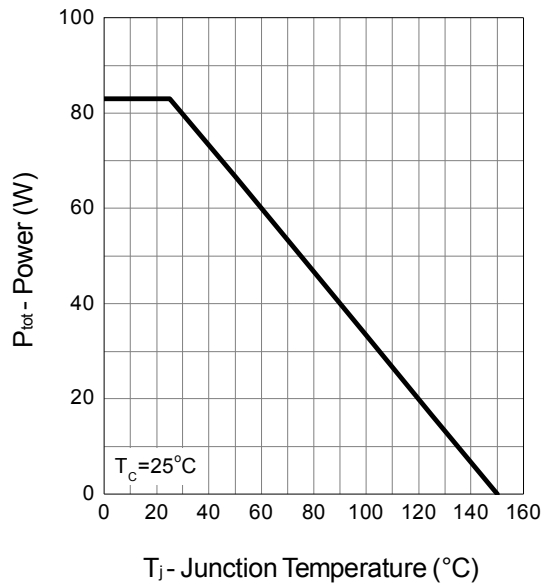
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,6}	$V_G=V_D=0V$, Force Current	---	---	20	A
I_{SM}	Pulsed Source Current ^{2,6}		---	---	45	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V, I_S=20A, T_J=25^\circ\text{C}$	---	---	1.3	V
t_{rr}	Reverse Recovery Time	$I_F=20A, dI/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	40	---	nS
Q_{rr}	Reverse Recovery Charge		---	83	---	nC

Note :

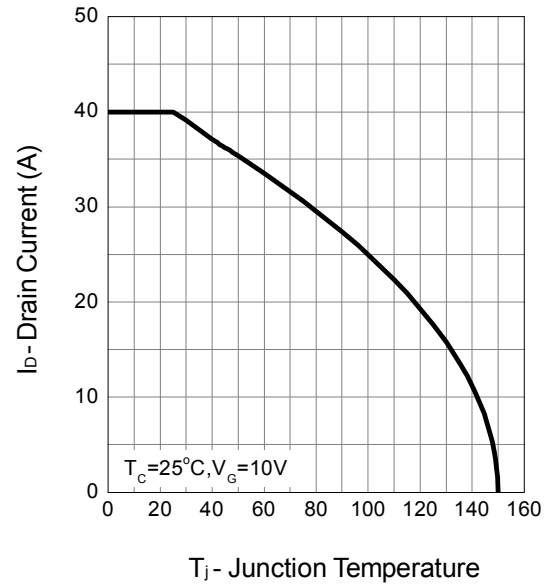
- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, $t<10\text{sec}$.
- 2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=18A$
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The Min. value is 100% EAS tested guarantee.
- 6.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

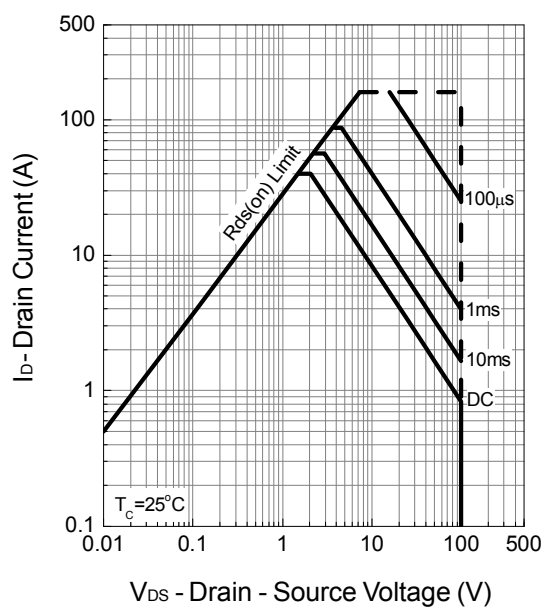
Power Dissipation



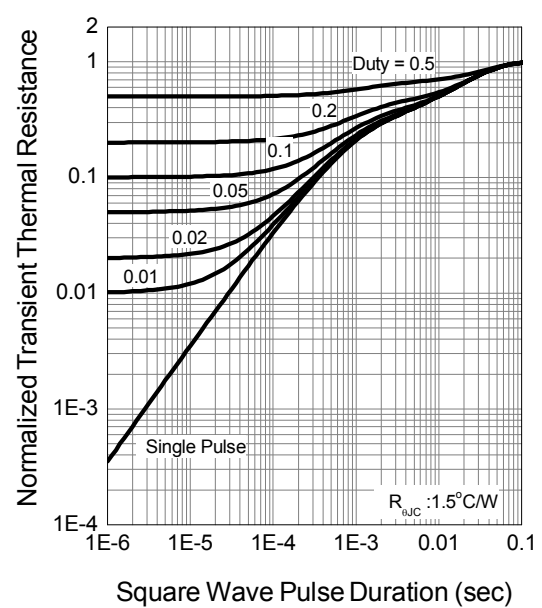
Drain Current



Safe Operation Area

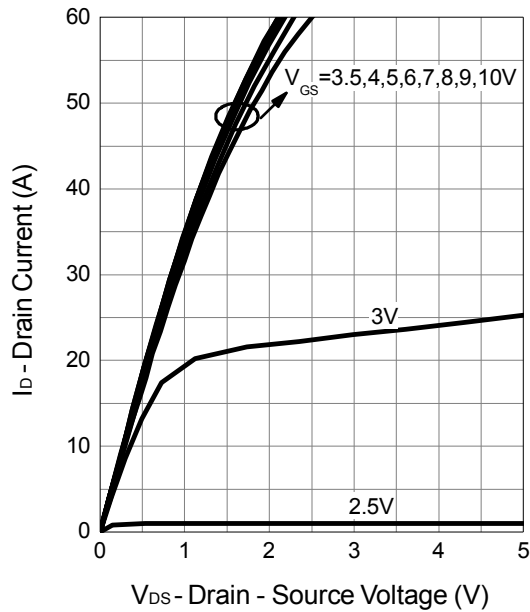


Thermal Transient Impedance

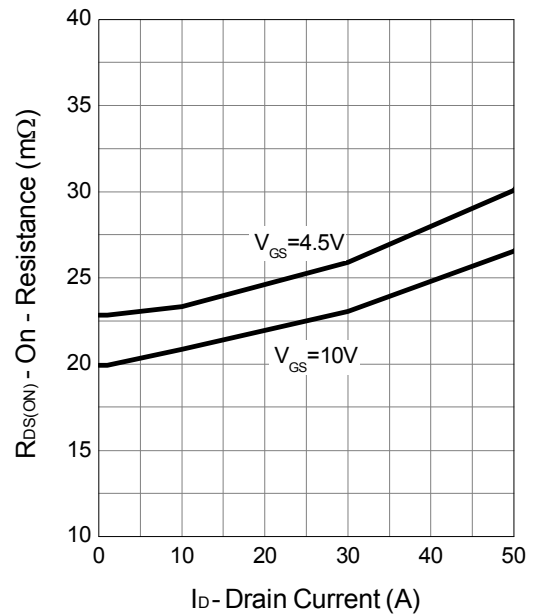


Typical Characteristics

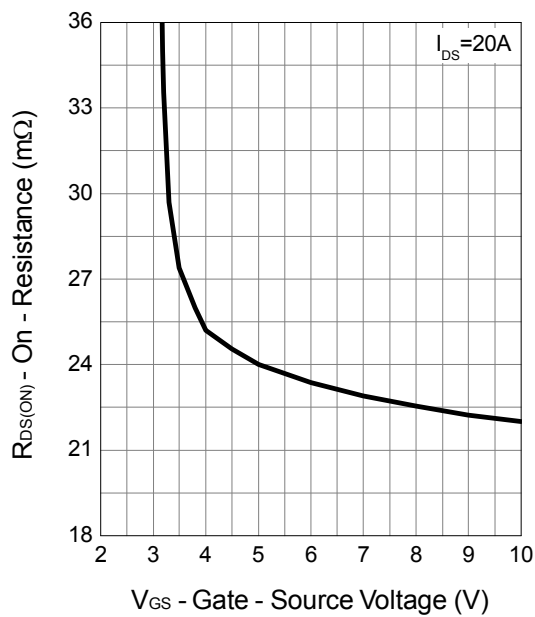
Output Characteristics



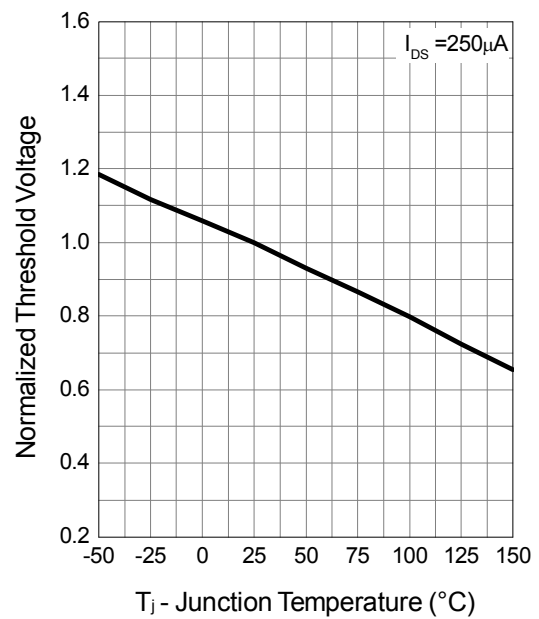
Drain-Source On Resistance



Gate-Source On Resistance

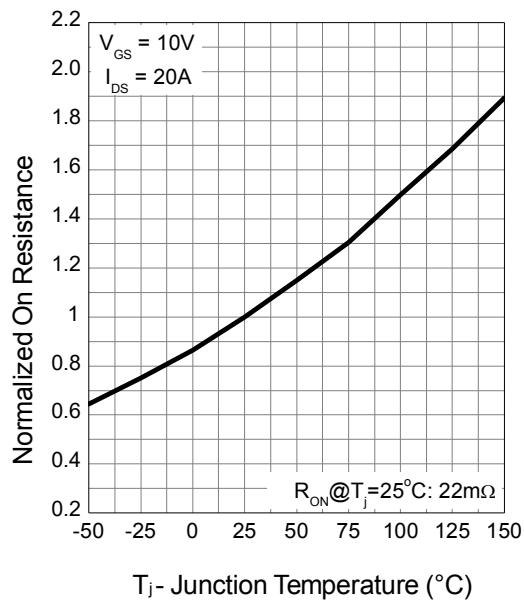


Gate Threshold Voltage

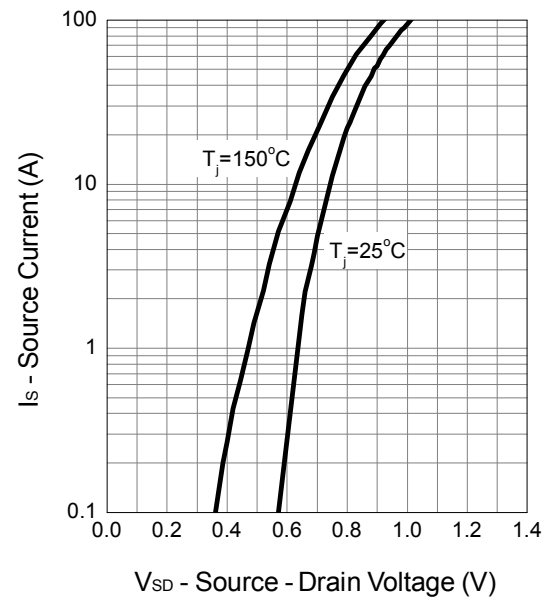


Typical Characteristics

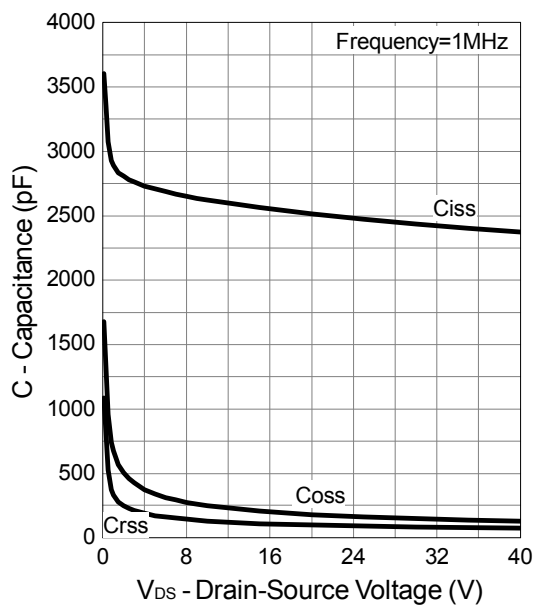
Drain-Source On Resistance



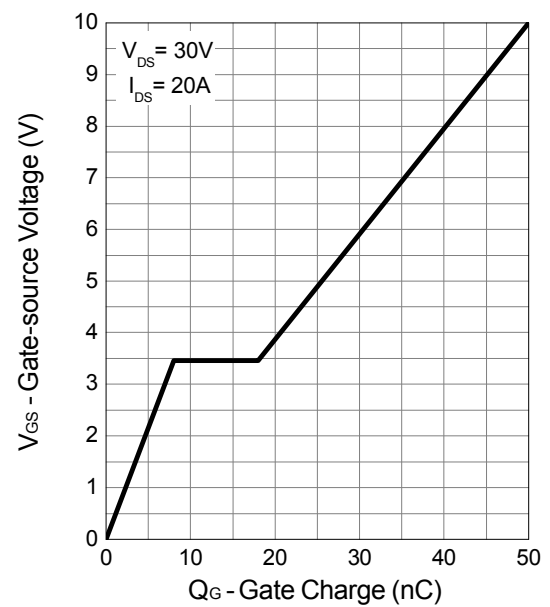
Source-Drain Diode Forward

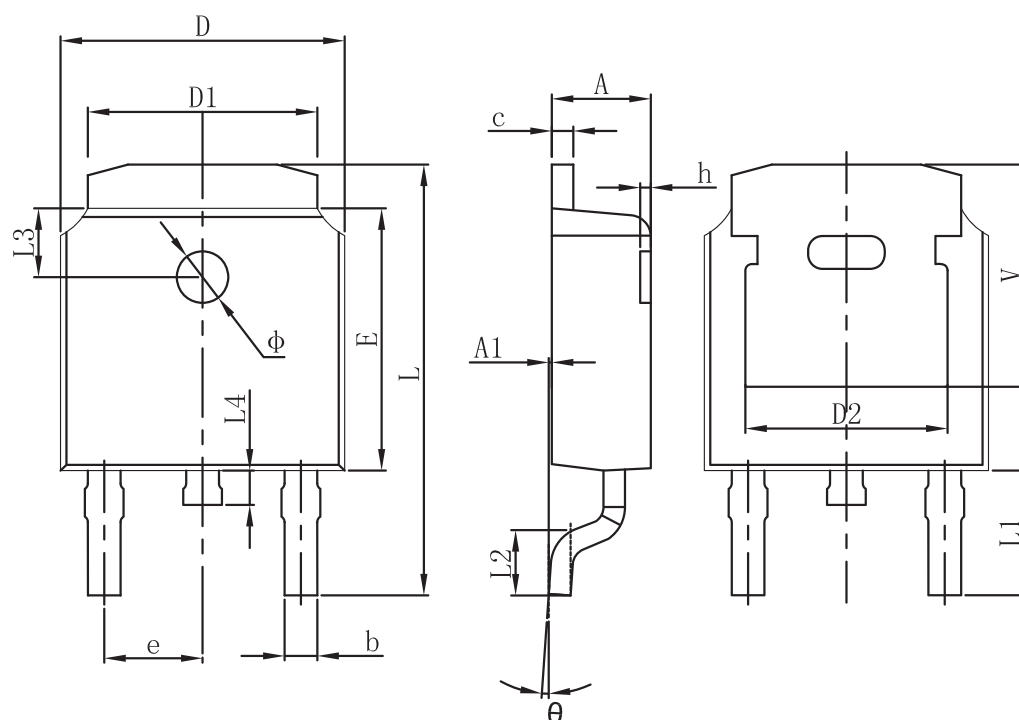


Capacitance



Gate Charge



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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