

### General Description

The WSF15N10 is the highest performance trench N-ch MOSFET with extreme high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The WSF15N10 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 Cdv/dt effect decline
- Green Device Available

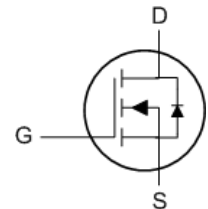
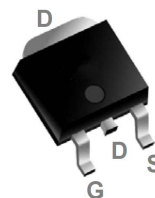
### Product Summary

BVDSS	RDSON	ID
100V	80mΩ	15A

### Applications

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

### TO-252 Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	100	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	15	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	11	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	64	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	30	mJ
$I_{AS}$	Avalanche Current	6	A
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>3</sup>	60	W
$P_D@T_C=100^\circ C$	Total Power Dissipation <sup>3</sup>	30	W
$T_{STG}$	Storage Temperature Range	-55 to 170	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 170	$^\circ C$

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	---	50	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	2.5	$^\circ C/W$

**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	100	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.098	---	V/°C
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =5A	---	80	100	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =2A	---	115	130	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.5	2.0	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-4.57	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =5A	---	13	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	2	4	Ω
Q <sub>g</sub>	Total Gate Charge (10V)	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =5A	12	21	30	nC
Q <sub>gs</sub>	Gate-Source Charge		3.4	4.9	6.4	
Q <sub>gd</sub>	Gate-Drain Charge		2.9	5.8	8.7	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =30V, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω I <sub>D</sub> =1A, R <sub>L</sub> =30Ω	---	13	24	ns
T <sub>r</sub>	Rise Time		---	10	19	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	32	60	
T <sub>f</sub>	Fall Time		---	16	30	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHz	730	940	1250	pF
C <sub>oss</sub>	Output Capacitance		45	80	115	
C <sub>rss</sub>	Reverse Transfer Capacitance		25	50	75	

**Guaranteed Avalanche Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy <sup>5</sup>	V <sub>DD</sub> =25V, L=0.5mH, I <sub>AS</sub> =6A	25	---	---	mJ

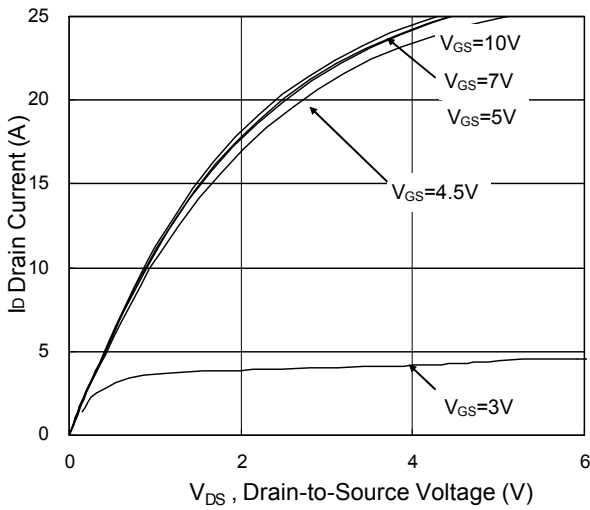
**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	5	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,6</sup>		---	---	64	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =5A, T <sub>J</sub> =25°C	---	---	1.1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =5A, di/dt=100A/μs, T <sub>J</sub> =25°C	33	47	61	nS
Q <sub>rr</sub>	Reverse Recovery Charge		61	87	113	nC

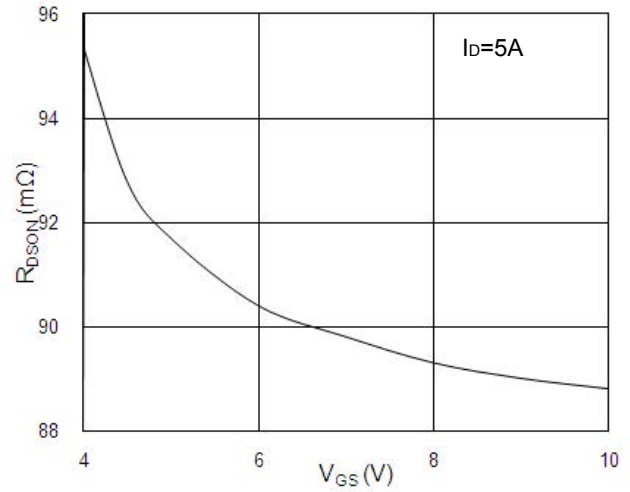
Note :

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper, t<sub>l</sub>≤10sec.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.5mH, I<sub>AS</sub>=6A
- The power dissipation is limited by 150°C junction temperature
- The Min. value is 100% EAS tested guarantee.
- 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.

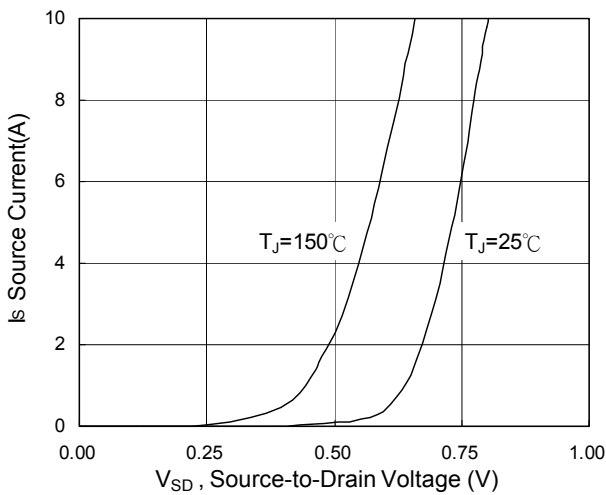
**Typical Characteristics**



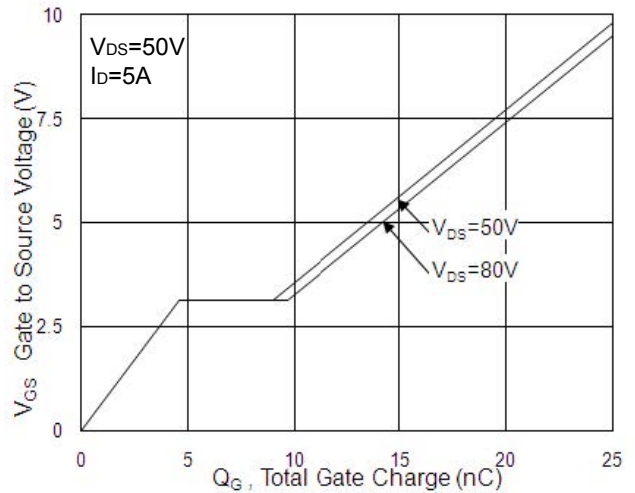
**Fig.1 Typical Output Characteristics**



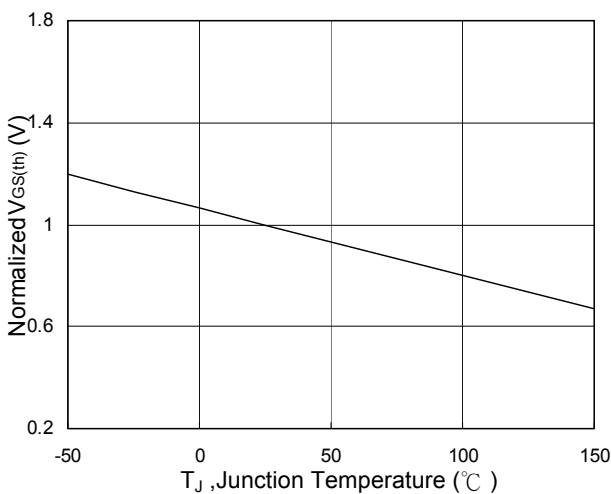
**Fig.2 On-Resistance vs. Gate-Source**



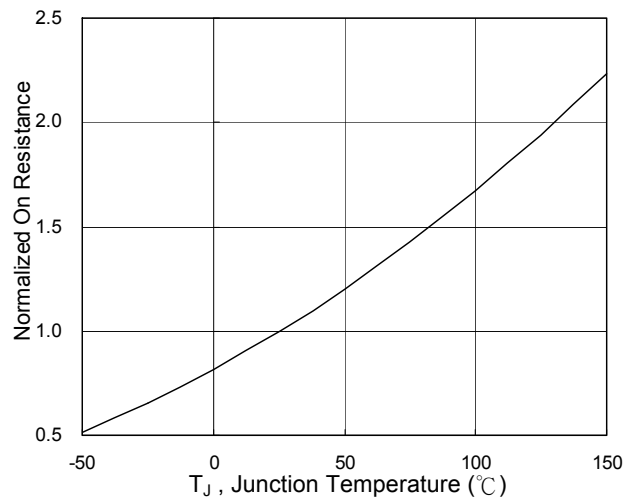
**Fig.3 Forward Characteristics Of Reverse**



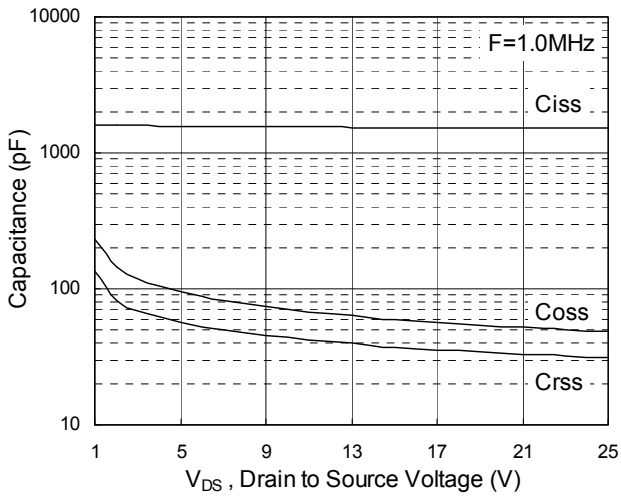
**Fig.4 Gate-Charge Characteristics**



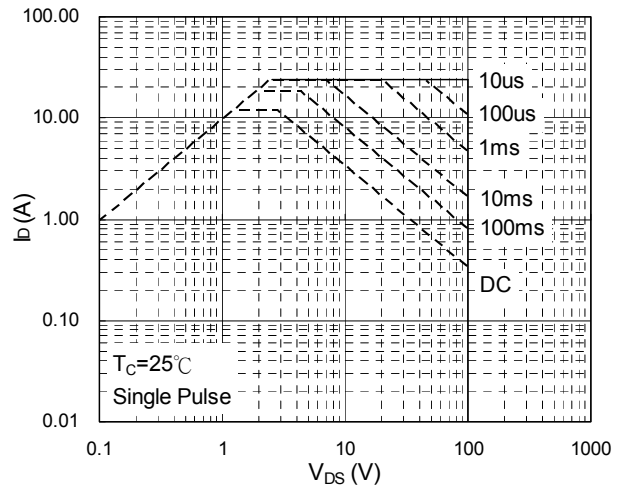
**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



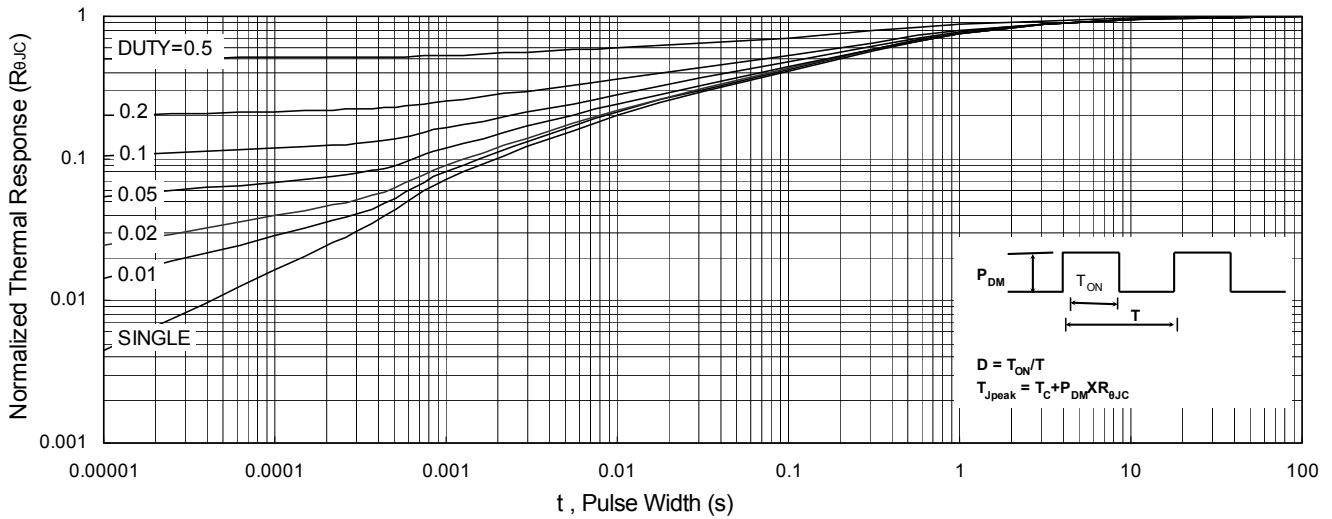
**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**



**Fig.7 Capacitance**



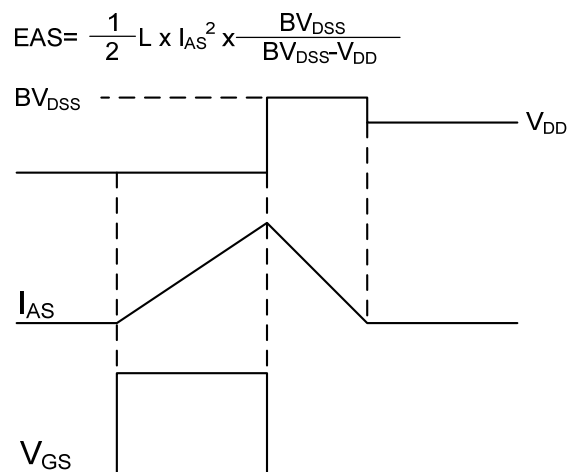
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**



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