

## General Description

The WSP4868 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 WSP4868 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
- 100% EAS Guaranteed
- Green Device Available

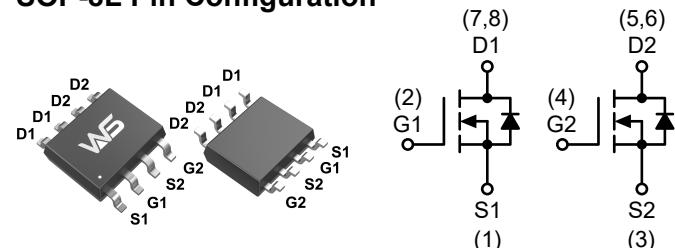
## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
30V	13mΩ	12A

## Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

## SOP-8L Pin Configuration



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_c = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	12	A
$I_D @ T_c = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	8.0	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	36	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	19	mJ
$I_{AS}$	Avalanche Current	13	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation <sup>4</sup>	2.5	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
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	---	65.2	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	50	°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	30	---	---	V
△BV <sub>DSS</sub> /△T <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.044	---	°C/V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =2A	---	13	14	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =2A	---	19	20	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.0	1.4	2.5	V
△V <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-3.8	---	°C/mV
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =24V, 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> =4A	---	33	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	2.5	5	Ω
Q <sub>g</sub>	Total Gate Charge (10V)	V <sub>DS</sub> =24V, V <sub>GS</sub> =10V, I <sub>D</sub> =2A	---	14	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	5.5	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	4.0	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =15V, V <sub>GEN</sub> =10V, R <sub>G</sub> =6Ω	---	5.2	---	ns
T <sub>r</sub>	Rise Time		---	9	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	23	---	
T <sub>f</sub>	Fall Time		---	9	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz	---	610	---	pF
C <sub>oss</sub>	Output Capacitance		---	102	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	60	---	

**Guaranteed Avalanche Characteristics**

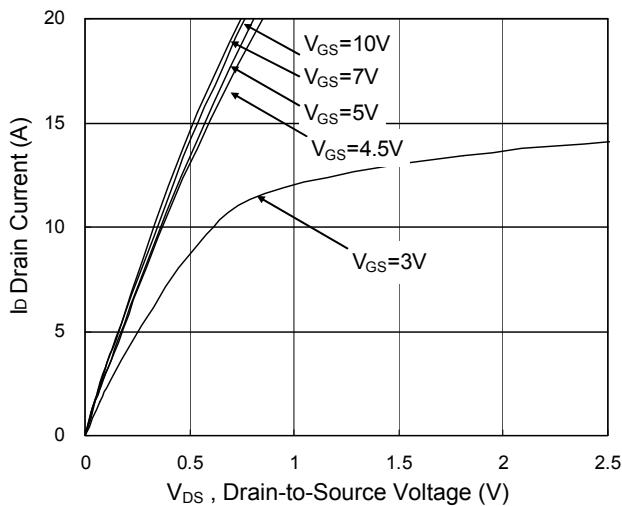
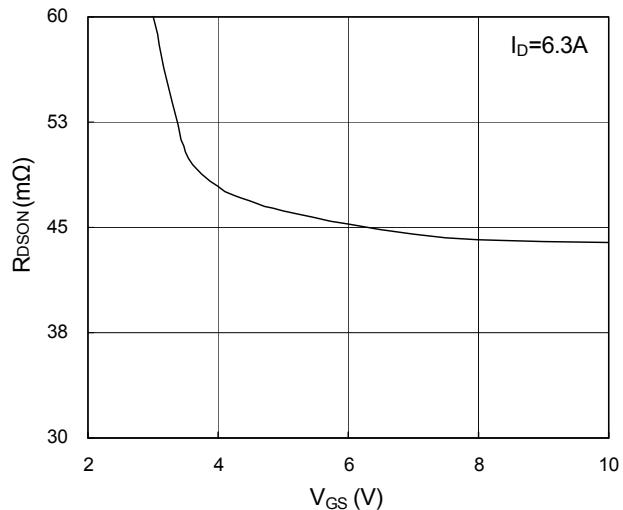
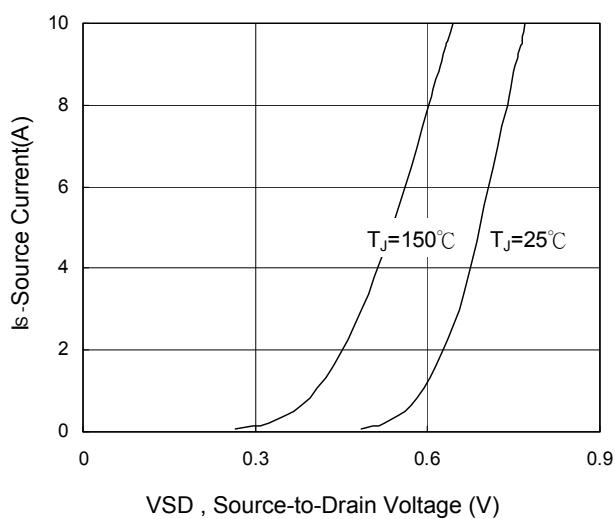
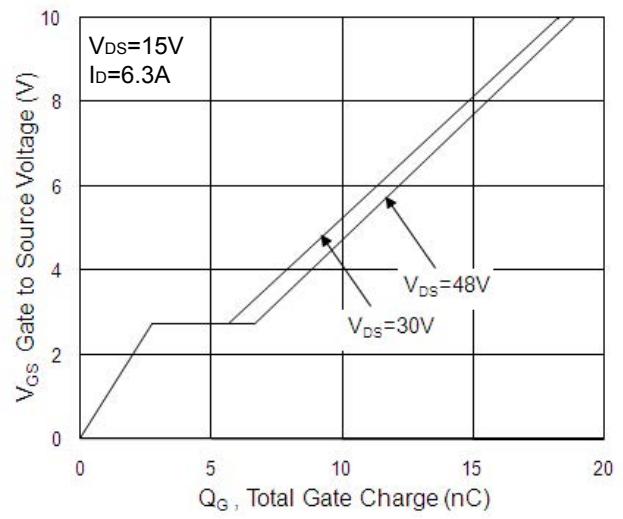
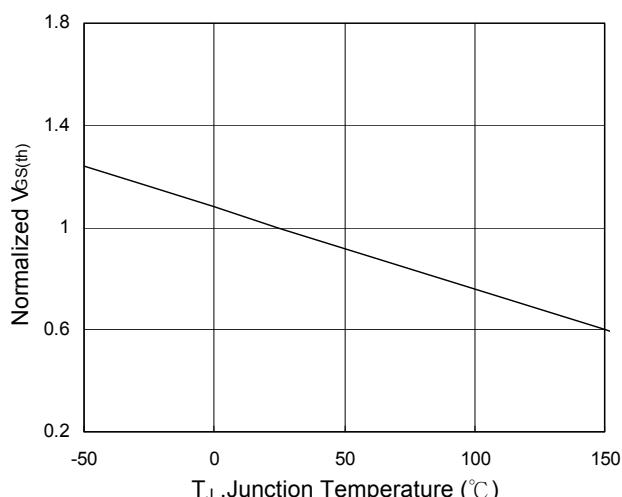
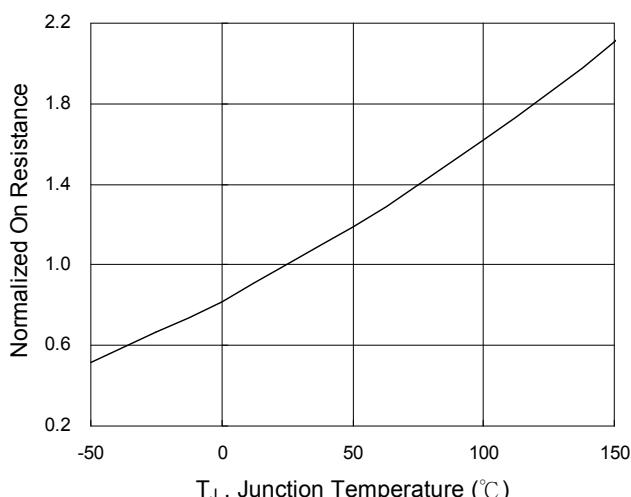
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy <sup>5</sup>	V <sub>DD</sub> =25V, L=0.1mH, I <sub>AS</sub> =13A	15	---	---	mJ

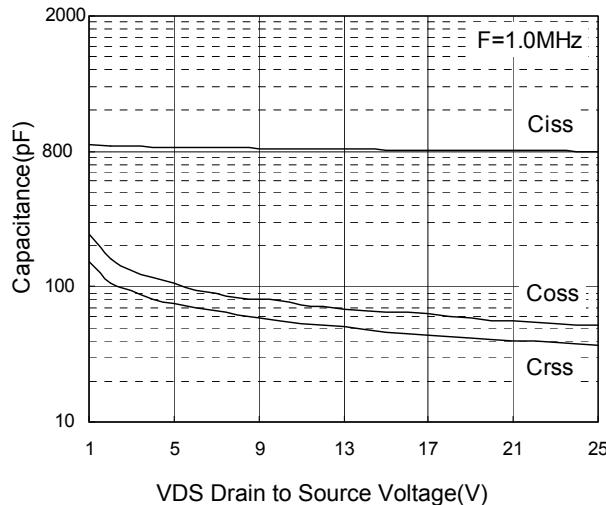
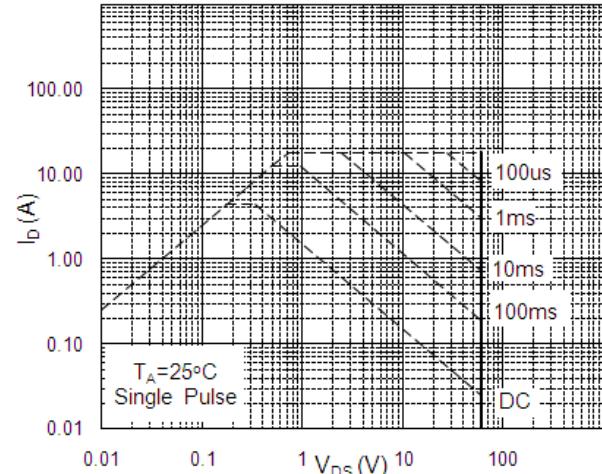
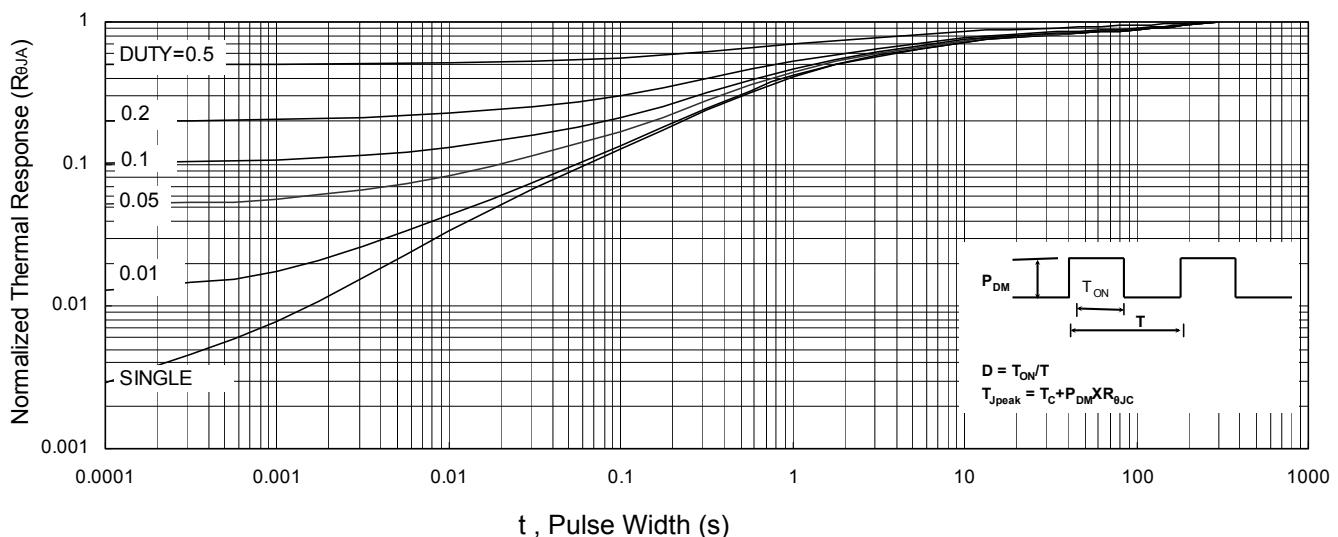
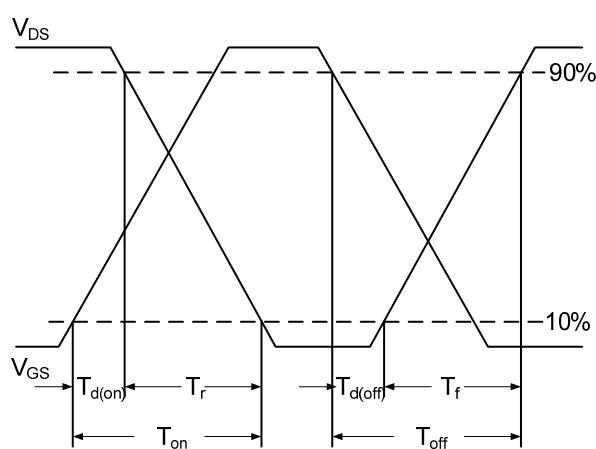
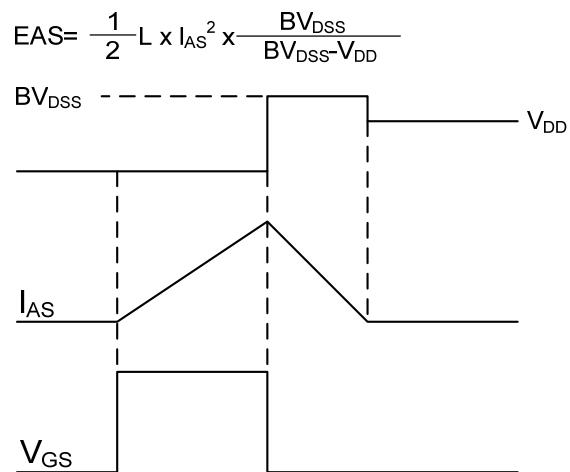
**Diode Characteristics**

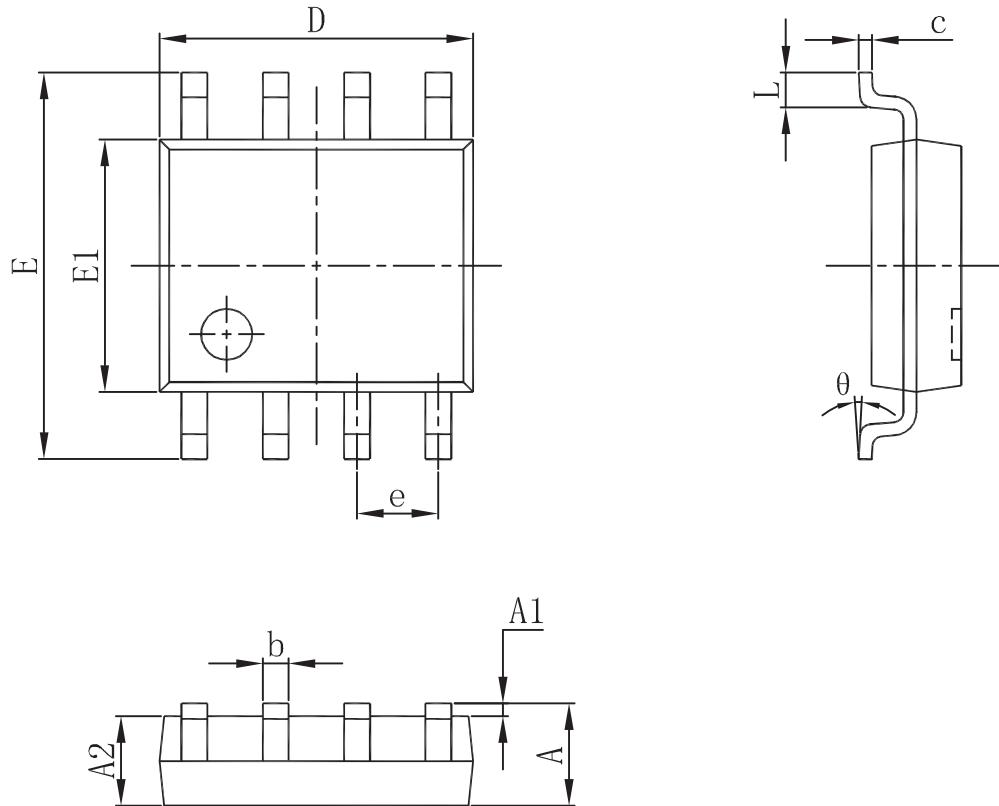
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	5.0	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,6</sup>		---	---	13	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1.1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =6.3A, dI/dt=100A/μs, T <sub>J</sub> =25°C	---	18	---	ns
Q <sub>rr</sub>	Reverse Recovery Charge		---	16	---	nC

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  $\leq$  300us , duty cycle  $\leq$  2%
- 3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V,V<sub>GS</sub>=10V,L=0.1mH,I<sub>AS</sub>=12A
- 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<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**

**Packaging information**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



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