

### General Description

The WSD30L65DN33 is the highest performance trench P-Channel MOSFET with extreme high cell density, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

The WSD30L65DN33 meet the RoHS and Green Product requirement 100%  $E_{AS}$  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

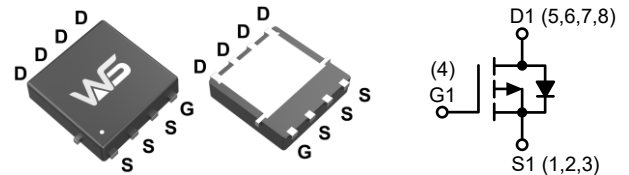
### Product Summary

BVDSS	RDSON	ID
-30V	7.5mΩ	-50A

### Applications

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

### DFN3X3-8L Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 25$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-50	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-20	A
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-11.9	A
$I_D@T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-9.5	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	-150	A
$E_{AS}$	Single Pulse Avalanche Energy <sup>3</sup>	54	mJ
$I_{AS}$	Avalanche Current	-33	A
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	35.7	W
$P_D@T_A=25^\circ C$	Total Power Dissipation <sup>4</sup>	2.08	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>	---	60	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup> ( $t \leq 10s$ )	---	40	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	3.5	$^\circ C/W$

**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	-30	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.0232	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-25A	---	7.5	9.5	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-15A	---	12	17	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-1.3	-1.8	-2.3	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	4.6	---	mV/°C
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> =85°C	---	---	-30	
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> =-30A	---	15	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	8	---	Ω
Q <sub>g</sub>	Total Gate Charge (-4.5V)	V <sub>DS</sub> =-15V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-25A	---	23.2	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	7.5	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	12.7	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =-15V, V <sub>GS</sub> =-10V, R <sub>G</sub> =6Ω I <sub>D</sub> =-1A, R <sub>L</sub> =15Ω	---	12	22	ns
T <sub>r</sub>	Rise Time		---	13	23	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	62	112	
T <sub>f</sub>	Fall Time		---	101	182	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	---	2240	2910	pF
C <sub>oss</sub>	Output Capacitance		---	465	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	320	---	

**Diode Characteristics**

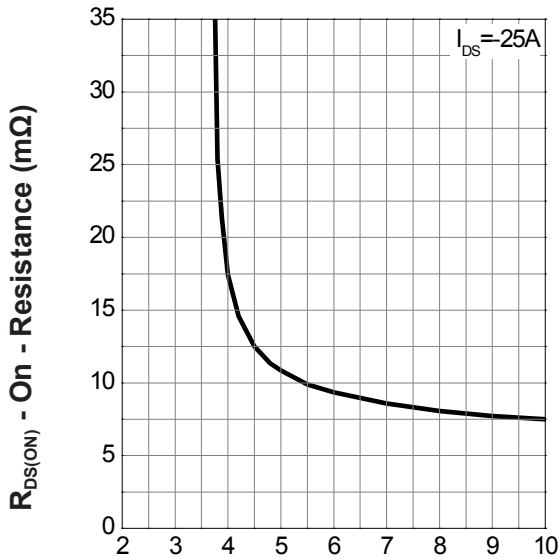
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-50	A
I <sub>DM</sub>	Pulsed Source Current <sup>2,6</sup>		---	---	-150	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C	---	-0.8	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =-25A, dI/dt=100A/μs, T <sub>J</sub> =25°C	---	23	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	10	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper, t<sub>≤</sub>10sec.
- 2.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 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>=-33A
- 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.

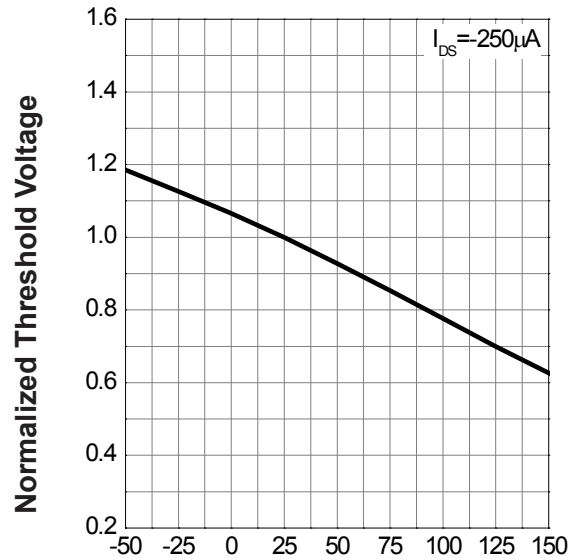
Typical Characteristics

Gate-Source On Resistance



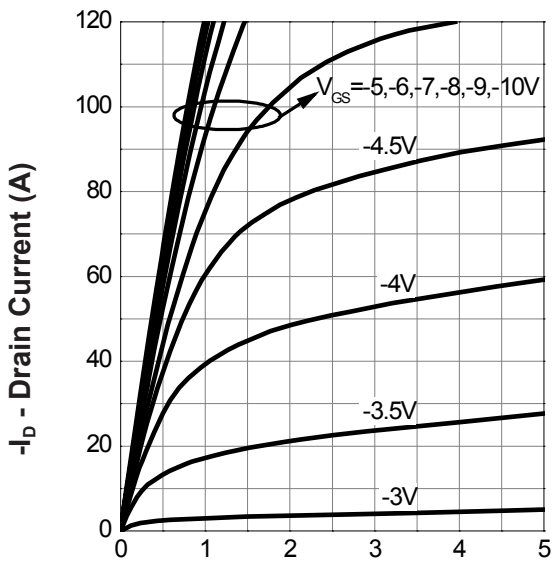
$-V_{GS}$  - Gate - Source Voltage (V)

Gate Threshold Voltage



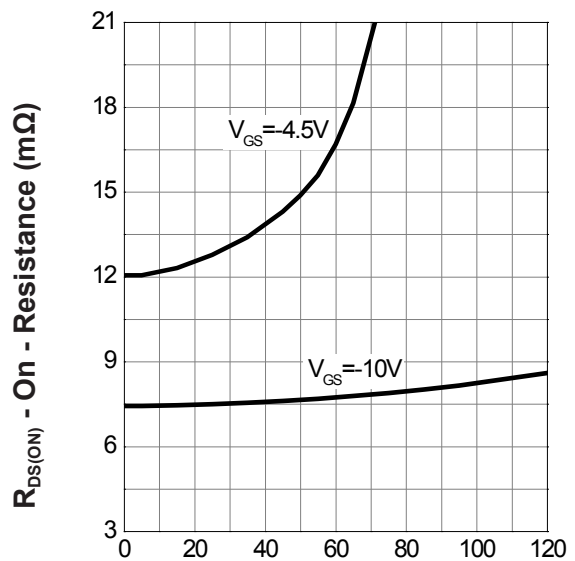
$T_j$  - Junction Temperature ( $^{\circ}C$ )

Output Characteristics



$-V_{DS}$  - Drain - Source Voltage (V)

Drain-Source On Resistance



$-I_D$  - Drain Current (A)

Typical Characteristics(Cont.)

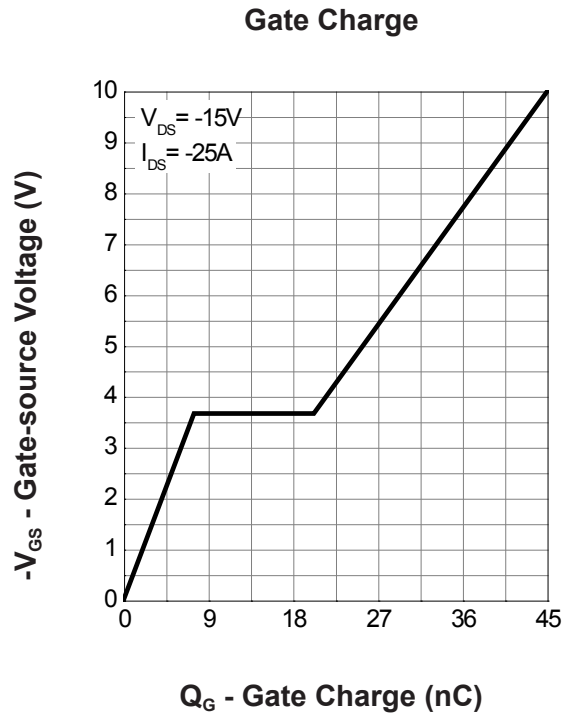
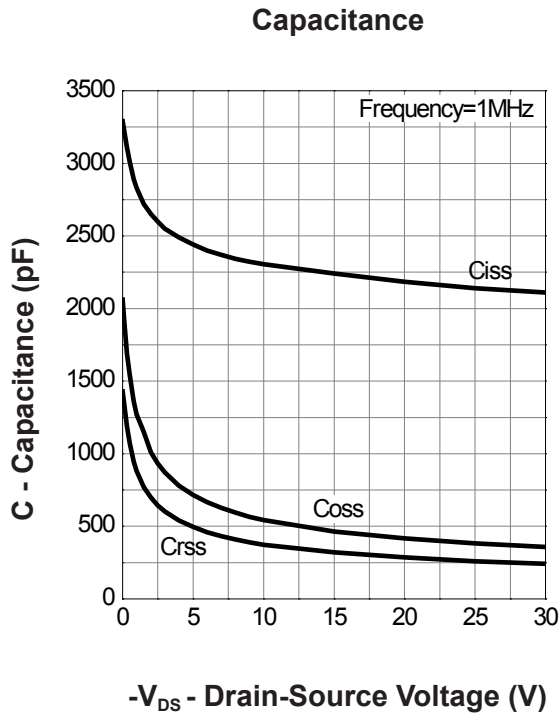


Fig.9 Normalized Maximum Transient Thermal Impedance

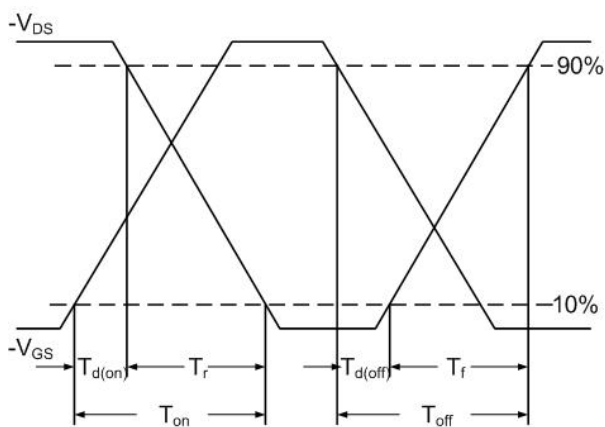


Fig.10 Switching Time Waveform

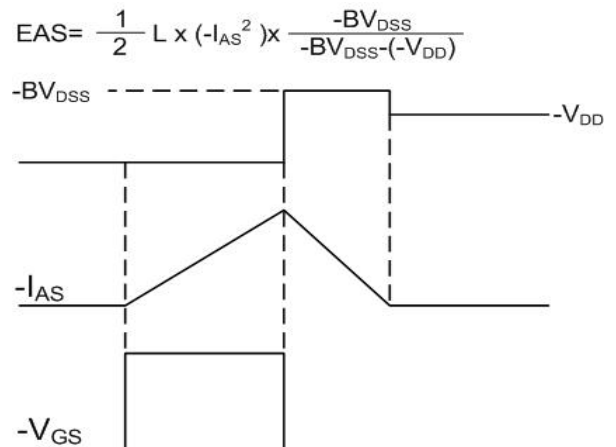
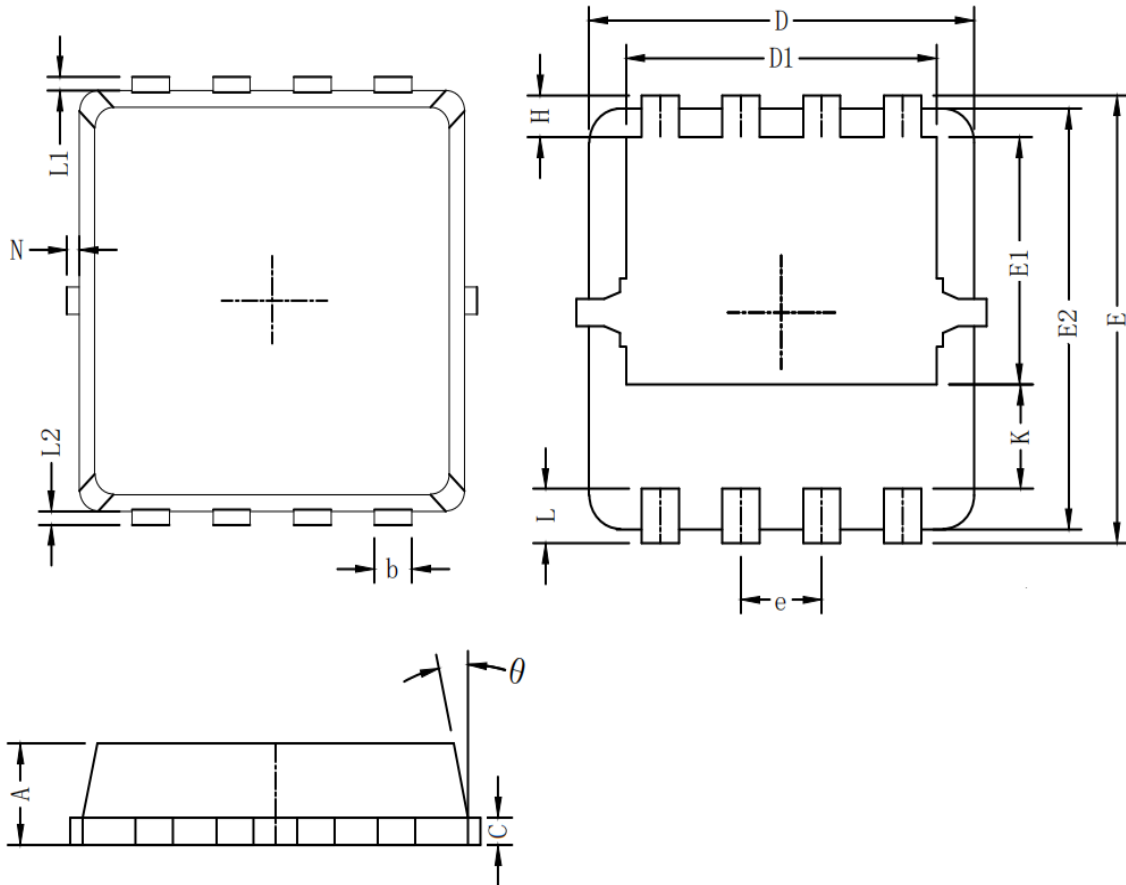


Fig.11 Unclamped Inductive Switching Waveform

**Packaging information**


Symbol	Dim in mm		
	min	typ	max
A	0.6	0.75	0.9
b	0.2	0.3	0.4
C	0.15	0.2	0.25
D	3	3.1	3.2
D1	2.3	2.45	2.6
E	3.15	3.3	3.45
E1	1.43	1.73	1.93
E2	2.9	3.05	3.2
e	0.65BSC		
H	0.2	0.35	0.5
K	0.57	0.77	0.87
L	0.3	0.4	0.5
L1/L2	0.1REF		
θ	8°	10°	13°
N	0		0.15



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