

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

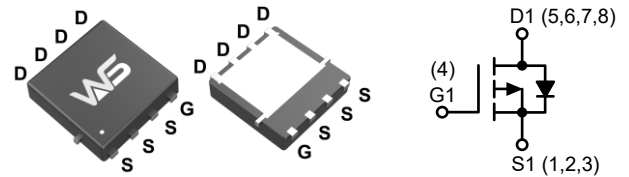
Product Summary

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	± 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 ²	-150	A
E_{AS}	Single Pulse Avalanche Energy ³	54	mJ
I_{AS}	Avalanche Current	-33	A
$P_D@T_C=25^\circ C$	Total Power Dissipation ⁴	35.7	W
$P_D@T_A=25^\circ C$	Total Power Dissipation ⁴	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 ¹	---	60	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹ ($t \leq 10s$)	---	40	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	3.5	$^\circ C/W$

Electrical Characteristics ($T_J=25^{\circ}\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BVDSS Temperature Coefficient	Reference to 25°C , $I_D=-1\text{mA}$	---	-0.0232	---	V/ $^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-10V, I_D=-25A$	---	7.5	9.5	m Ω
		$V_{GS}=-4.5V, I_D=-15A$	---	12	17	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.3	-1.8	-2.3	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.6	---	mV/ $^{\circ}\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-24V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	-1	μA
		$V_{DS}=-24V, V_{GS}=0V, T_J=85^{\circ}\text{C}$	---	---	-30	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=-5V, I_D=-30A$	---	15	---	S
R_g	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	8	---	Ω
Q_g	Total Gate Charge (-4.5V)	$V_{DS}=-15V, V_{GS}=-10V, I_D=-25A$	---	23.2	---	nC
Q_{gs}	Gate-Source Charge		---	7.5	---	
Q_{gd}	Gate-Drain Charge		---	12.7	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-15V, V_{GS}=-10V, R_G=6\Omega$ $I_D=-1A, R_L=15\Omega$	---	12	22	ns
T_r	Rise Time		---	13	23	
$T_{d(off)}$	Turn-Off Delay Time		---	62	112	
T_f	Fall Time		---	101	182	
C_{iss}	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$	---	2240	2910	pF
C_{oss}	Output Capacitance		---	465	---	
C_{rss}	Reverse Transfer Capacitance		---	320	---	

Diode Characteristics

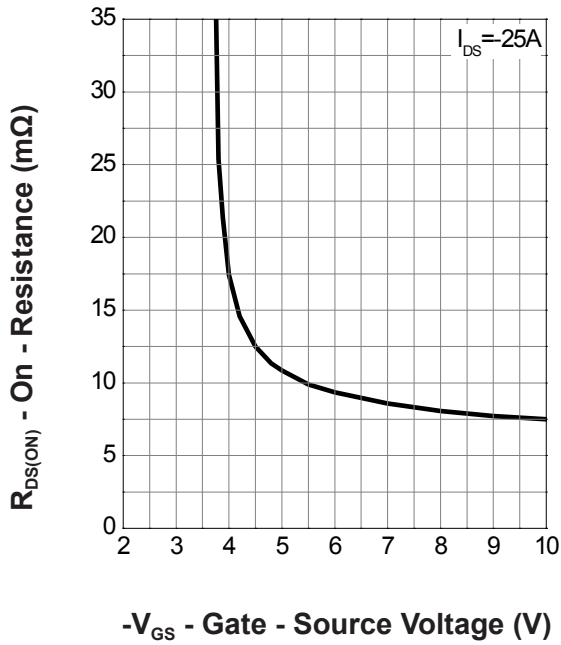
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,6}	$V_G=V_D=0V$, Force Current	---	---	-50	A
I_{DM}	Pulsed Source Current ^{2,6}		---	---	-150	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V, I_S=-1A, T_J=25^{\circ}\text{C}$	---	-0.8	-1.2	V
t_{rr}	Reverse Recovery Time	$I_F=-25A, dI/dt=100A/\mu s, T_J=25^{\circ}\text{C}$	---	23	---	nS
Q_{rr}	Reverse Recovery Charge		---	10	---	nC

Note :

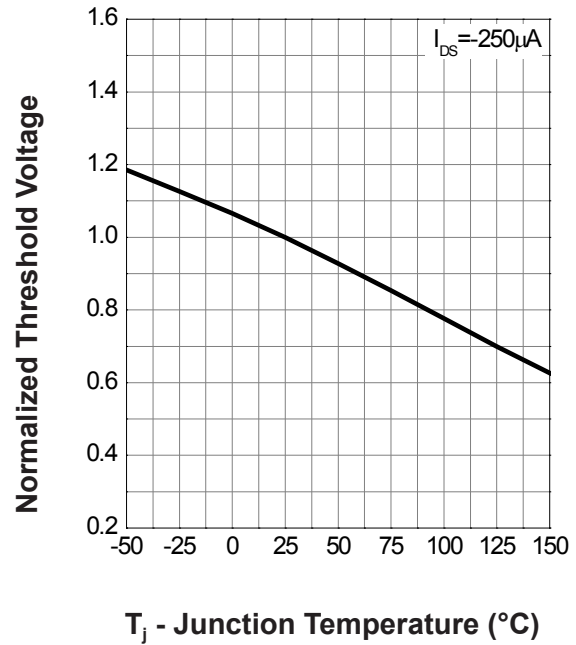
- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, $t \leq 10\text{sec}$.
- 2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=-25V, V_{GS}=-10V, L=0.1\text{mH}, I_{AS}=-33A$
- 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_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

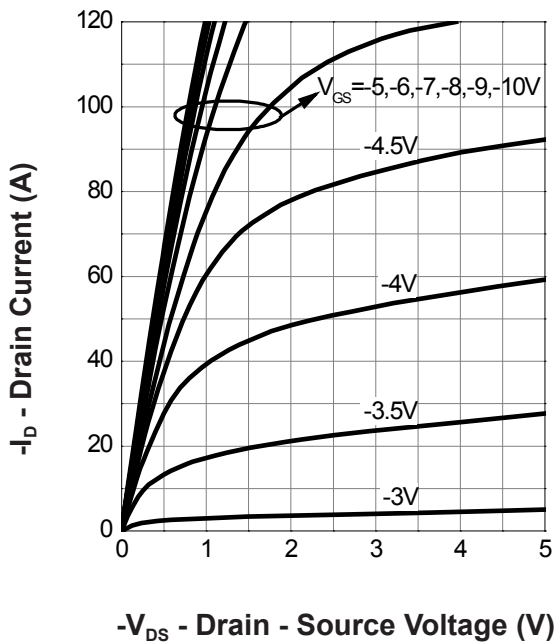
Gate-Source On Resistance



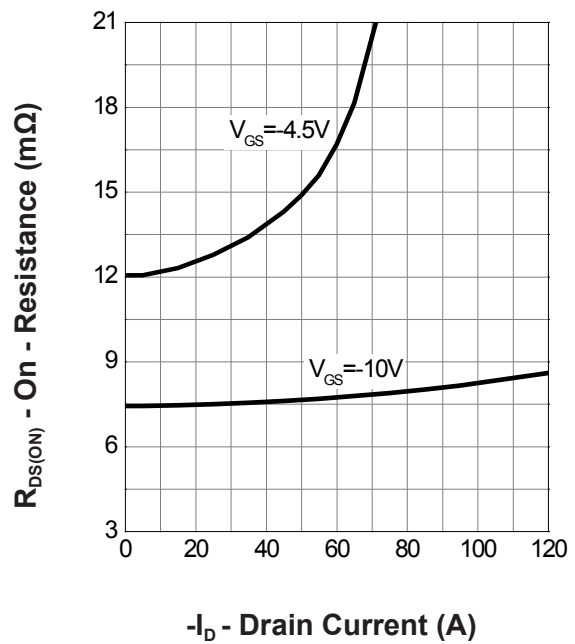
Gate Threshold Voltage



Output Characteristics



Drain-Source On Resistance



Typical Characteristics(Cont.)

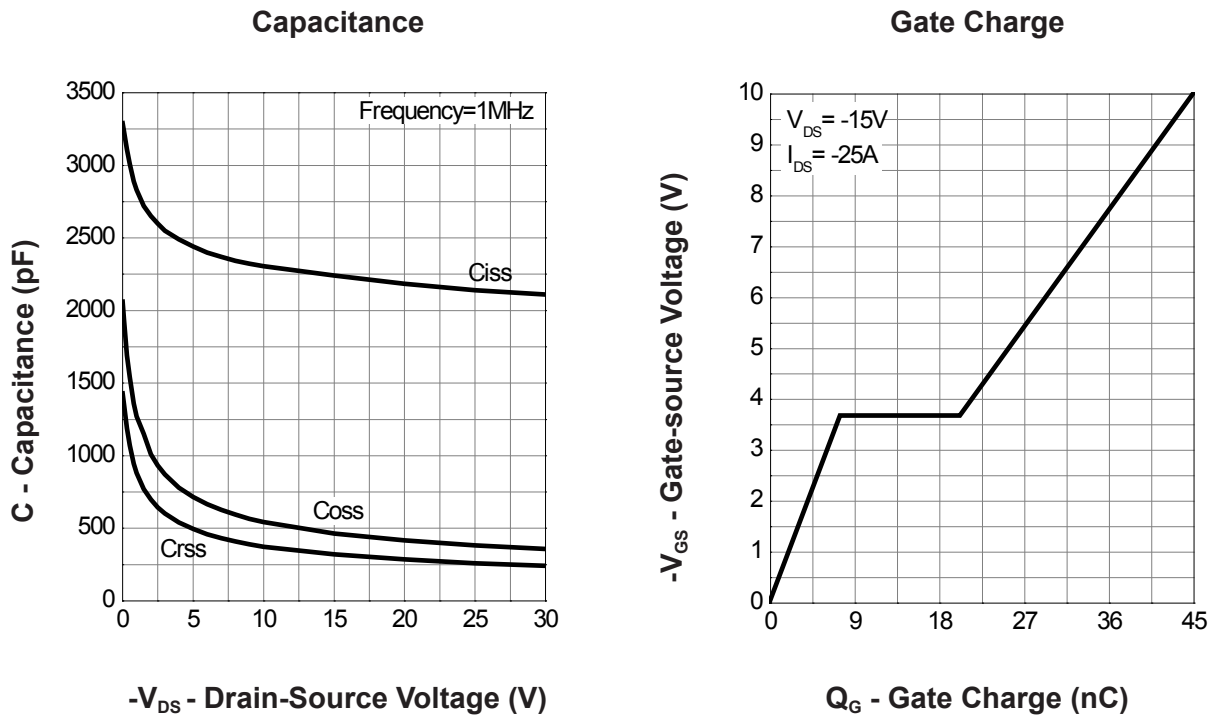


Fig.9 Normalized Maximum Transient Thermal Impedance

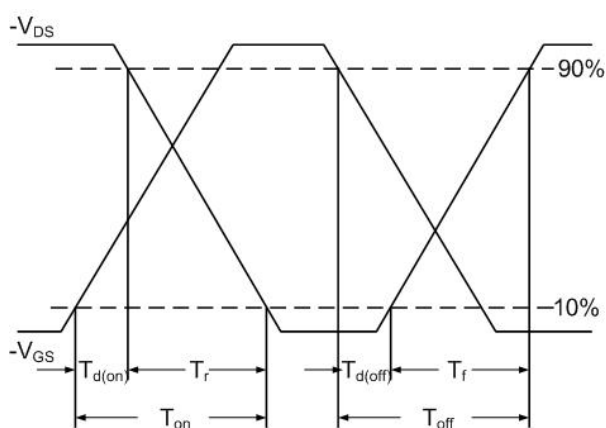


Fig.10 Switching Time Waveform

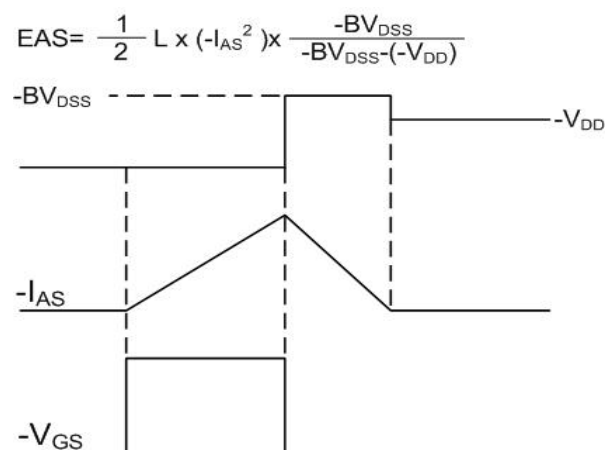
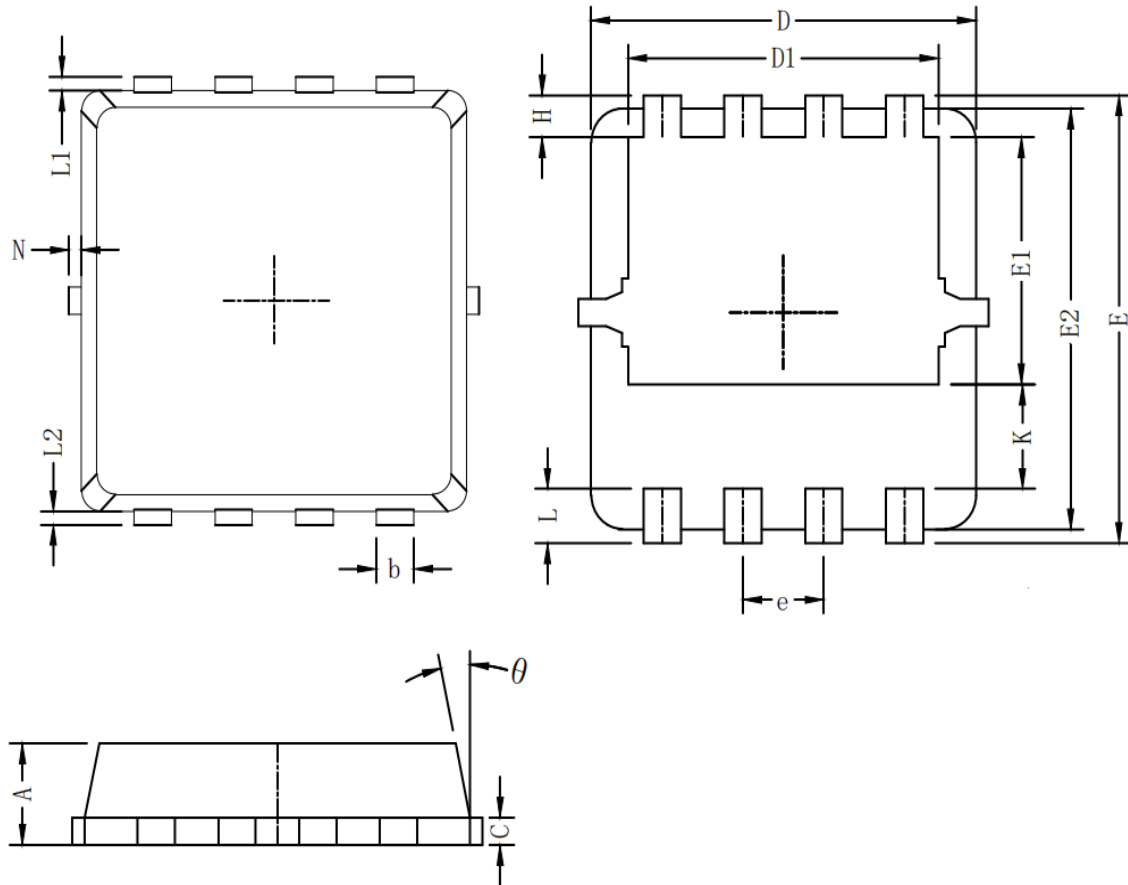


Fig.11 Unclamped Inductive Switching Waveform

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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