General Description

The WSD3030DN33 is the highest performance trench N-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 WSD3030DN33 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% E_{AS} Guaranteed
- Green Device Available

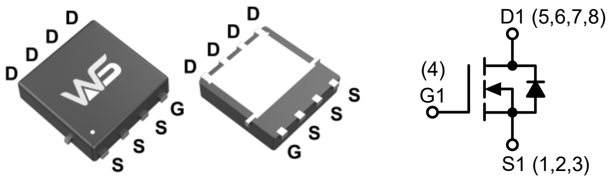
Product Summery

BV_{DSS}	$R_{DS(ON)}$	I_D
30V	15mΩ	34A

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	±20	
I_D@T_C=25°C	Continuous Drain Current, V_{GS} @ 10V [1]	34	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V [1]	21	
I_D@T_A=25°C	Continuous Drain Current, V_{GS} @ 10V [1]	12	
I_D@T_A=70°C	Continuous Drain Current, V_{GS} @ 10V [1]	10	
I_{DM}	Pulsed Drain Current [2]	80	
E_{AS}	Single Pulse Avalanche Energy [3]	25	mJ
I_{AS}	Avalanche Current	23	A
P_D@T_C=25°C	Power Dissipation [4]	25	W
P_D@T_A=25°C	Power Dissipation [4]	2.5	
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	

Thermal Data

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient [1]	---	70	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case [1]	---	5	

Electrical Characteristics (T_J=25°C, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250μA	30	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C, I_D=1mA	---	0.0232	---	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance [2]	V_{GS}=10V , I_D=20A	---	15	18	mΩ
		V_{GS}=4.5V , I_D=10A	---	23	28	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250μA	1.3	1.9	2.8	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.08	---	mV/°C
I_{DSS}	Drain-Source Leakage Current	V_{DS}=24V , V_{GS}=0V , T_J=25°C	---	---	1.0	μA
		V_{DS}=24V , V_{GS}=0V , T_J=55°C	---	---	5.0	
I_{GSS}	Gate-Source Leakage Current	V_{DS}=0V , V_{GS}=±20V	---	---	±100	nA
g_{fs}	Forward Transconductance	V_{DS}=5V , I_D=30A	---	34	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f = 1.0MHz	---	2.5	3.3	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=15V , V_{GS}=4.5V , I_D=20A	---	6.1	8	nC
Q_{gs}	Gate-Source Charge		---	2.4	2.9	
Q_{gd}	Gate-Drain Charge		---	2.3	3.2	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V , V_{GEN}=10V , R_G=6Ω I_D=1A , R_L=15Ω	---	8	14	ns
T_r	Rise Time		---	10	17	
$T_{d(off)}$	Turn-Off Delay Time		---	23	62	
T_f	Fall Time		---	5	12	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f = 1.0MHz	---	760	910	pF
C_{oss}	Output Capacitance		---	130	155	
C_{rss}	Reverse Transfer Capacitance		---	70	94	

Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy [5]	V_{DD}=25V , L=0.1mH , I_{AS}=23A	23	---	---	mJ

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current [1,6]	V_G=V_D=0V , Force Current	---	---	1.0	A
I_{SM}	Pulsed Source Curren [2,6]		---	---	80	A
V_{SD}	Diode Forward Voltage [2]	V_{GS}=0V , I_S=1A , T_J=25°C	---	---	1.0	V
t_{rr}	Reverse Recovery Time	I_F=20A, dI/dt=100A/μs,T_J=25°C	---	18.5	---	ns
Q_{rr}	Reverse Recovery Charge		---	10	---	nC

Note:

1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper, t<10sec.
2. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
3. The E_{AS} data shows Max. rating . The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=23A
4. The power dissipation is limited by 150°C junction temperature.
5. The Min. value is 100% E_{AS} 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

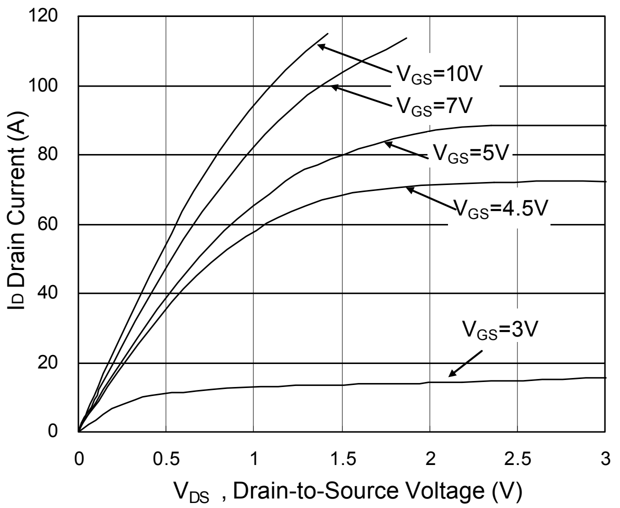


Fig.1 Typical Output Characteristics

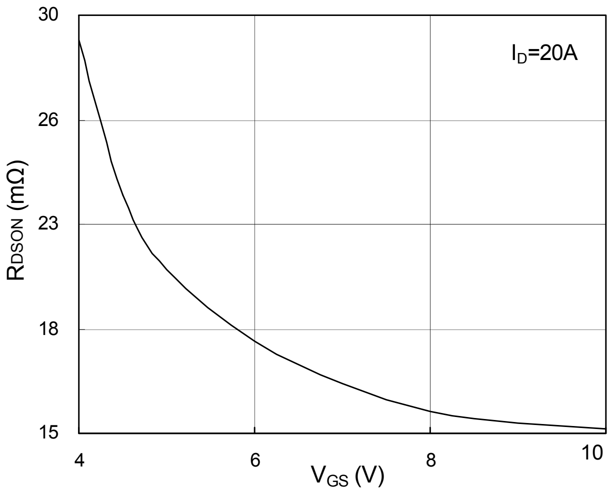


Fig.2 On-Resistance vs. G-S Voltage

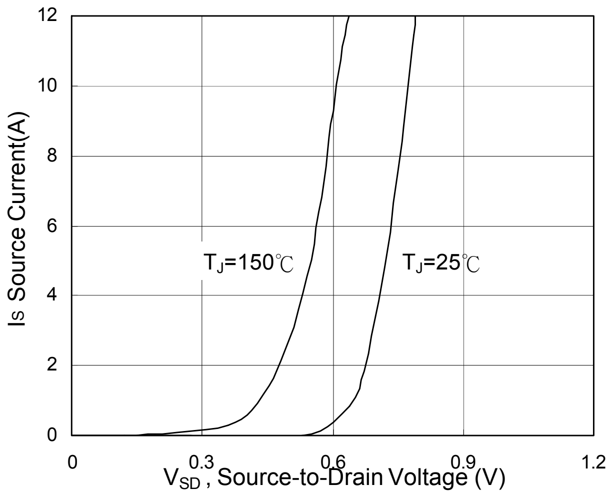


Fig.3 Forward Characteristics of Reverse

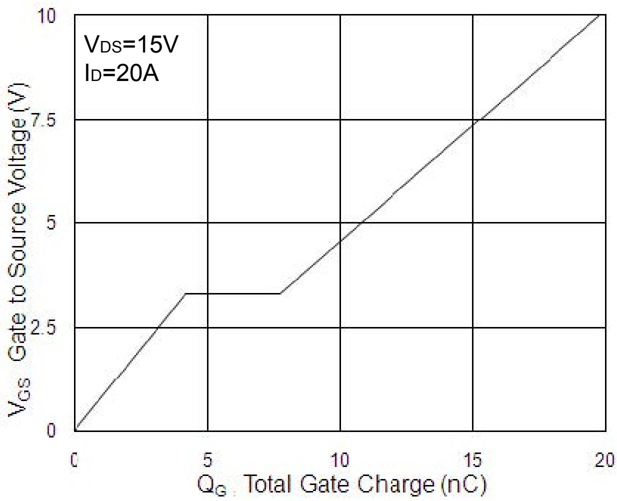


Fig.4 Gate-charge Characteristics

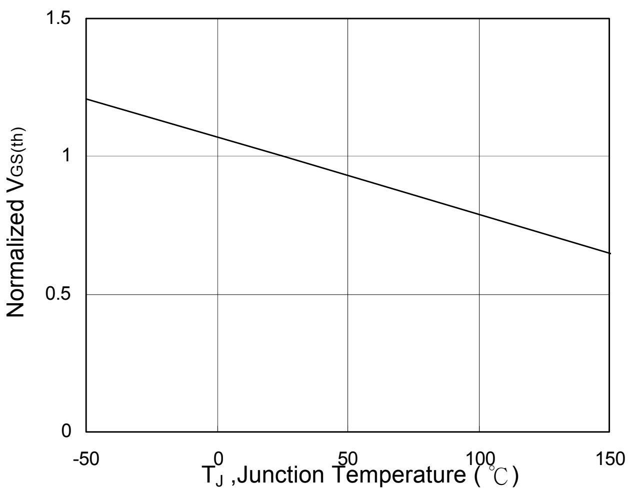


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

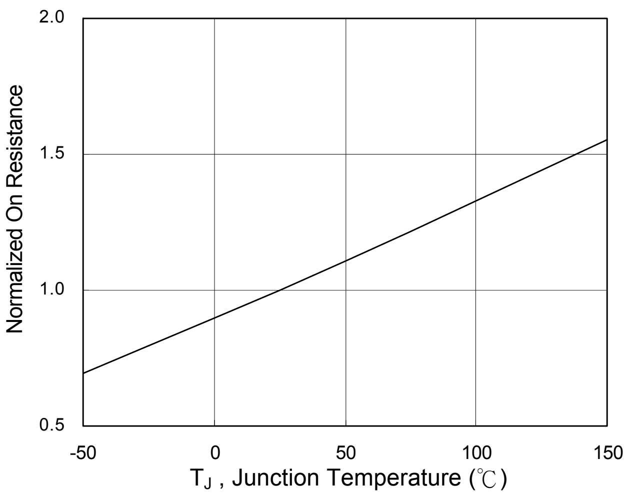


Fig.6 Normalized R_{DSON} vs. T_J

Typical Characteristics (Cont.)

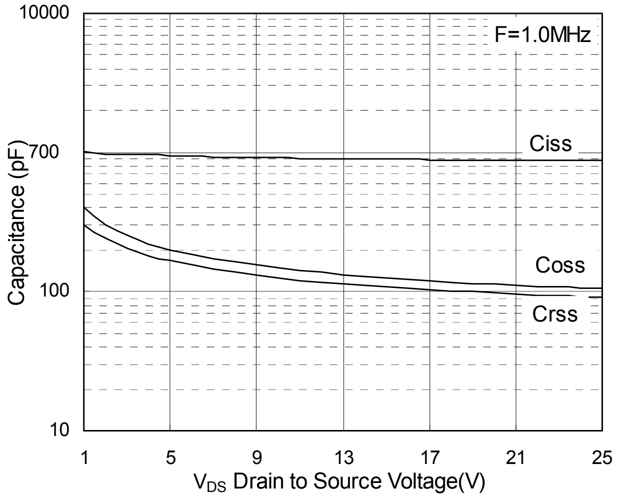


Fig.7 Capacitance

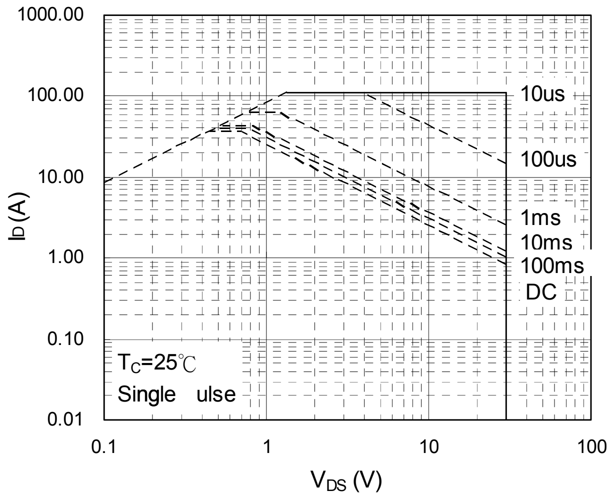


Fig.8 Safe Operating Area

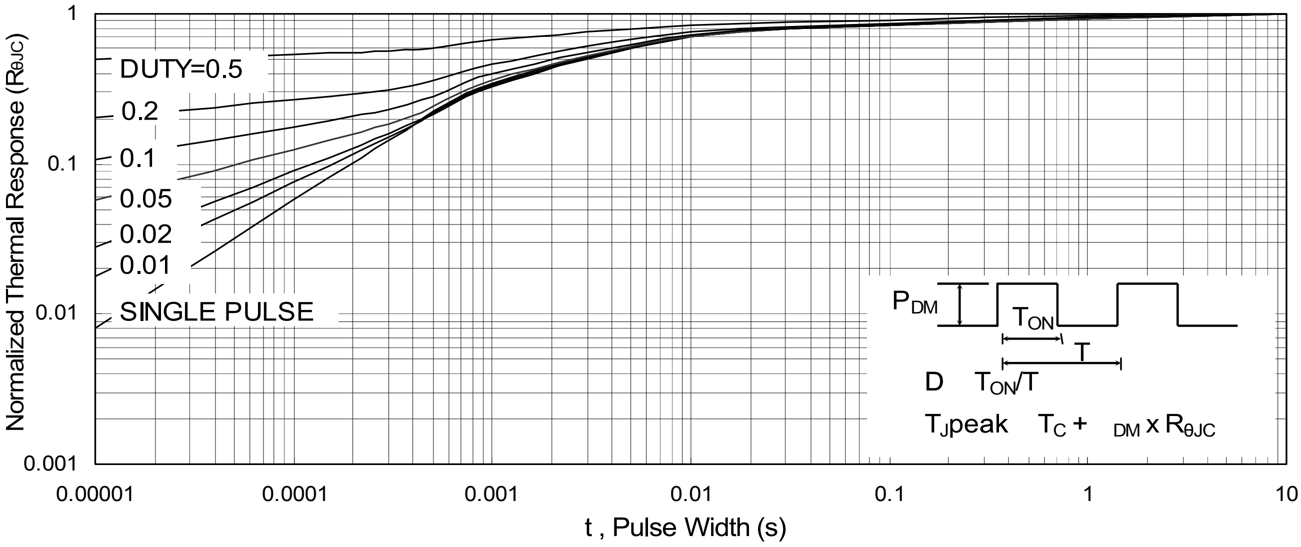


Fig.9 Normalized Maximum Transient Thermal Impedance

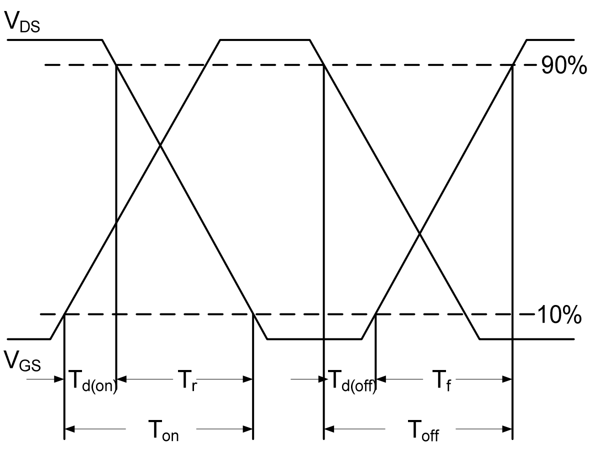


Fig.10 Switching Time Waveform

$$EAS = \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

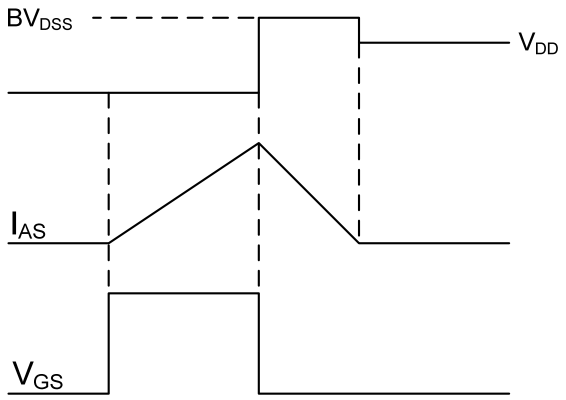
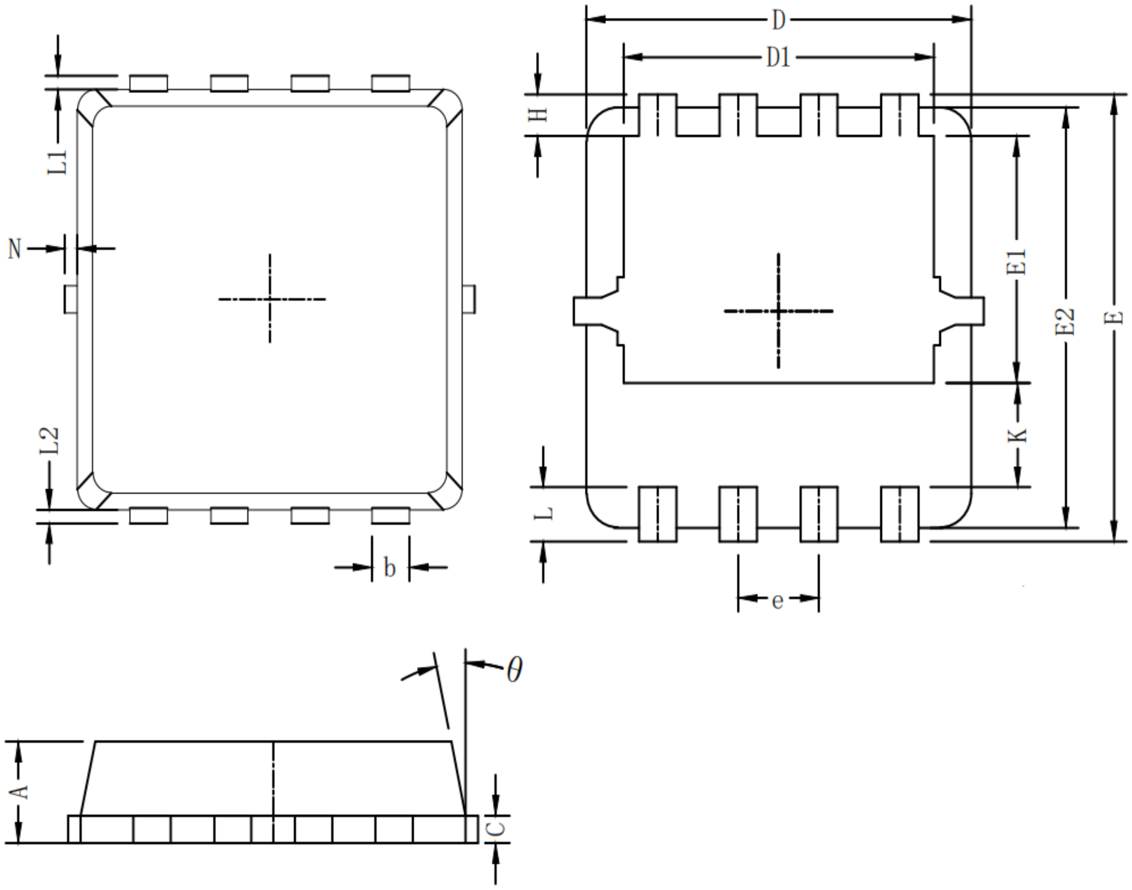


Fig.11 Unclamped Inductive Switching Waveform

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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