WSD4038DN33

N-Channel MOSFET

General Description

The WSD4038DN33 is the highest performance trench N-Channel MOSFETs with extreme high cell density , which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The WSD4038DN33 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

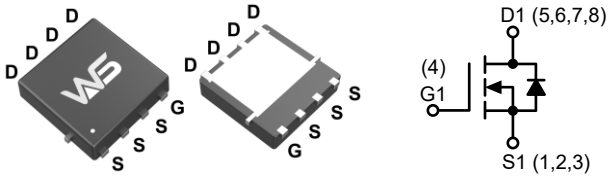
Product Summery

BV_{DSS}	$R_{DS(ON)}$	I_D
40V	10.5mΩ	38A

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	40	V
V_{GS}	Gate-Source Voltage	±20	
I_D@T_C=25°C	Continuous Drain Current, V_{GS} @ 10V [1]	38	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V [1]	20	
I_D@T_A=25°C	Continuous Drain Current, V_{GS} @ 10V [1]	15	
I_D@T_A=70°C	Continuous Drain Current, V_{GS} @ 10V [1]	10	
I_{DM}@T_C=25°C	Pulsed Drain Current [2]	36	
E_{AS}	Avalanche Energy, Single Pulse (L=0.1mH) [3]	26	mJ
I_{AS}	Avalanche Current, Single pulse(L=0.1mH) [3]	36	A
P_D@T_C=25°C	Total Power Dissipation [4]	2.1	W
P_D@T_A=70°C	Total Power Dissipation [4]	1.78	
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]	---	60	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case [1]	---	2.1	

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	40	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance [2]	V_{GS}=10V , I_D=7A	---	10.5	13	mΩ
		V_{GS}=4.5V , I_D=5A	---	12	16	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250μA	1.5	1.8	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-6.06	---	mV/°C
I_{DSS}	Drain-Source Leakage Current	V_{DS}=32V , V_{GS}=0V , T_J=25°C	---	---	2.0	μA
		V_{DS}=32V , V_{GS}=0V , T_J=55°C	---	---	10	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
g_{fs}	Forward Transconductance	V_{DS}=5V , I_D=20A	---	31	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f = 1.0MHz	---	1.1	1.8	Ω
Q_g	Total Gate Charge (10V)	V_{DS}=20V , V_{GS}=10V , I_D=7A	---	20	28	nC
Q_{gs}	Gate-Source Charge		---	3.9	7.5	
Q_{gd}	Gate-Drain Charge		---	3.0	5.1	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=20V , V_{GEN}=10V , R_G=1Ω , I_{DS}=1A , R_L=20Ω	---	12.6	16	ns
T_r	Rise Time		---	10	12	
$T_{d(off)}$	Turn-Off Delay Time		---	23.6	32	
T_f	Fall Time		---	6	9	
C_{iss}	Input Capacitance	V_{DS}=20V , V_{GS}=0V , f = 1.0MHz	930	1125	1370	pF
C_{oss}	Output Capacitance		100	132	180	
C_{rss}	Reverse Transfer Capacitance		55	70	115	

Diode Characteristics

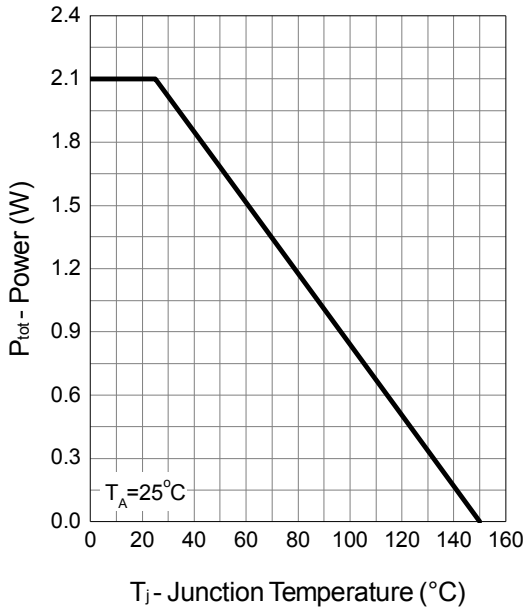
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current [1,6]	V_G=V_D=0V , Force Current	---	---	5	A
I_{SM}	Pulsed Source Curren [2,6]		---	---	15	A
V_{SD}	Diode Forward Voltage [2]	V_{GS}=0V , I_S=20A , T_J=25°C	---	---	1.1	V

Note:

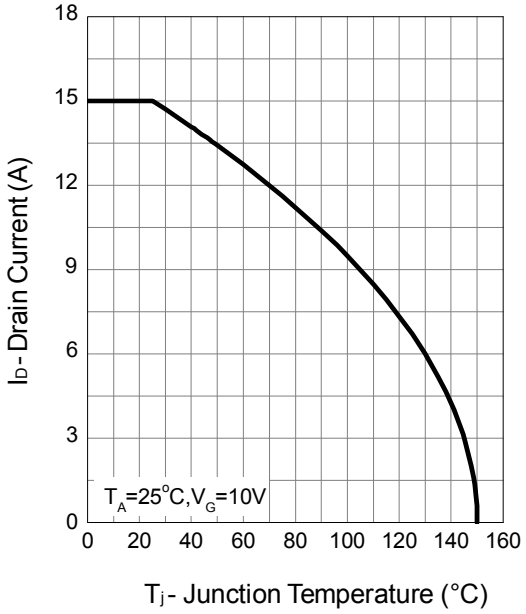
1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper, t<10sec.
2. The data tested by pulsed , pulse width ≤ 300μs , duty cycle ≤ 2%
3. The E_{AS} data shows Max. rating . The test condition is V_{DD}=25V, V_{GS}=10V, L=0.5mH, I_{AS}=13A
4. The power dissipation is limited by 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.
7. Package limitation current is 60A.

Typical Characteristics

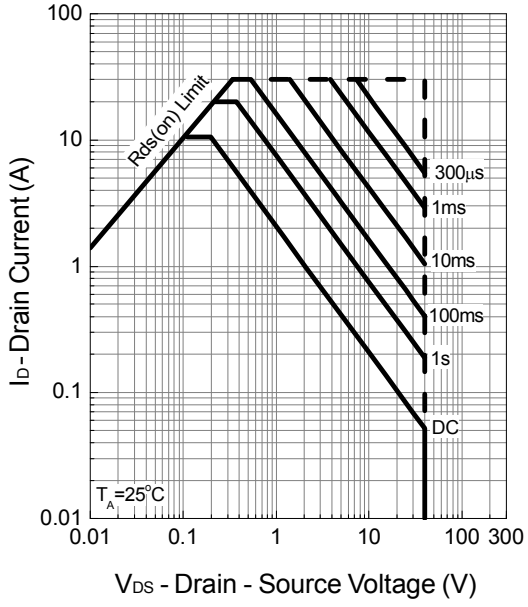
Power Dissipation



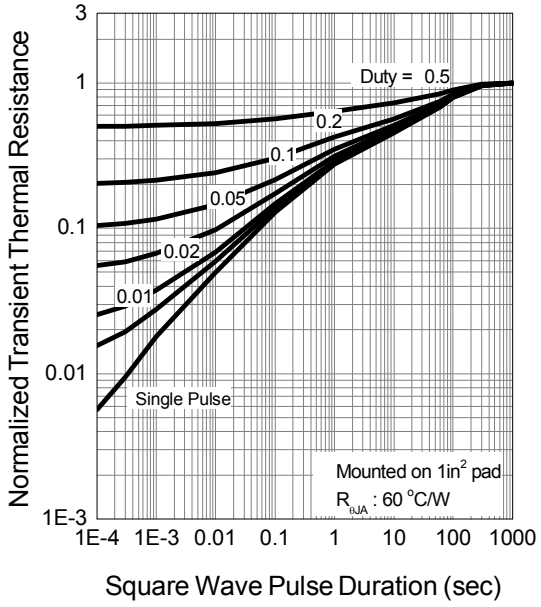
Drain Current



Safe Operation Area

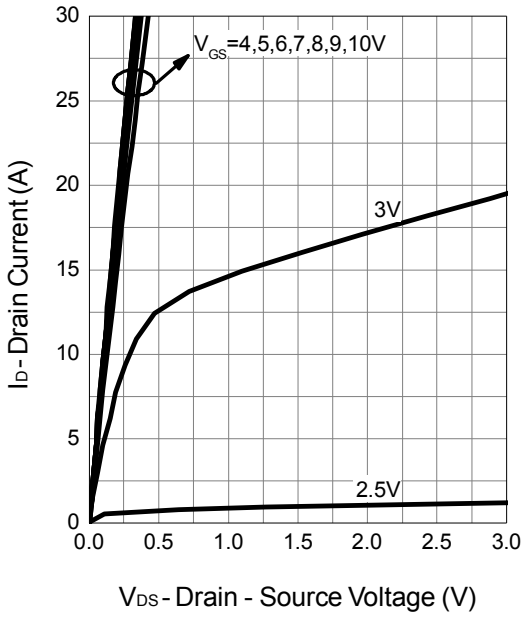


Thermal Transient Impedance

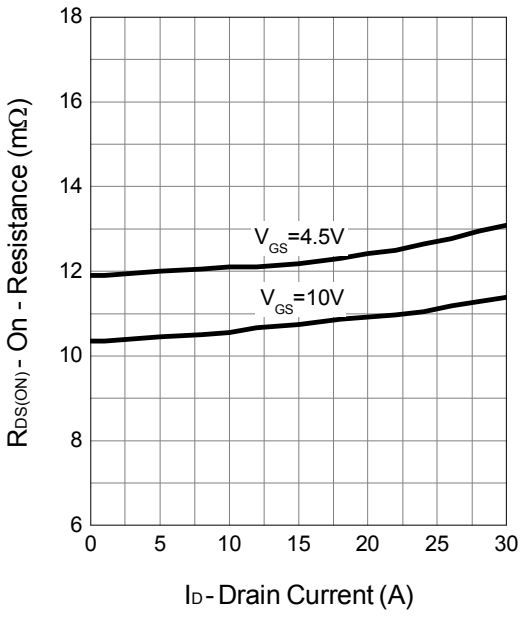


Typical Characteristics (Cont.)

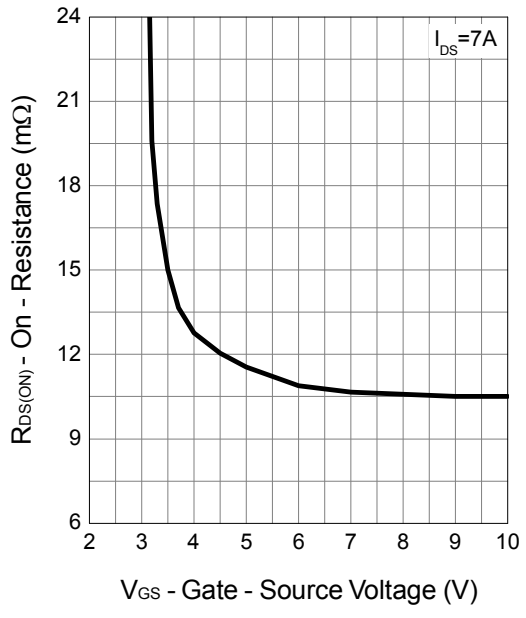
Output Characteristics



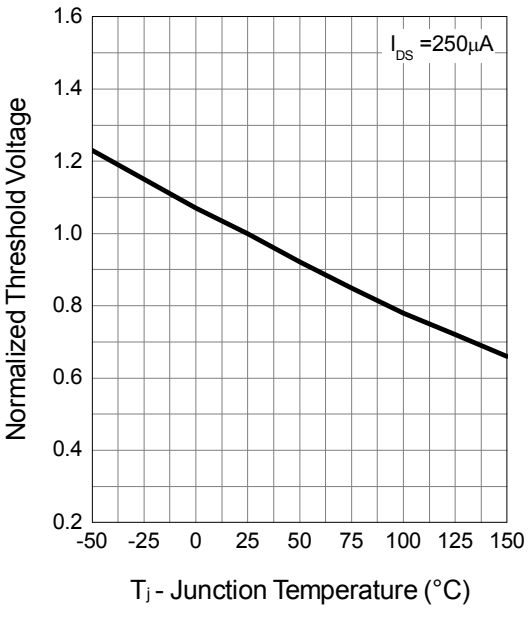
Drain-Source On Resistance



Gate-Source On Resistance

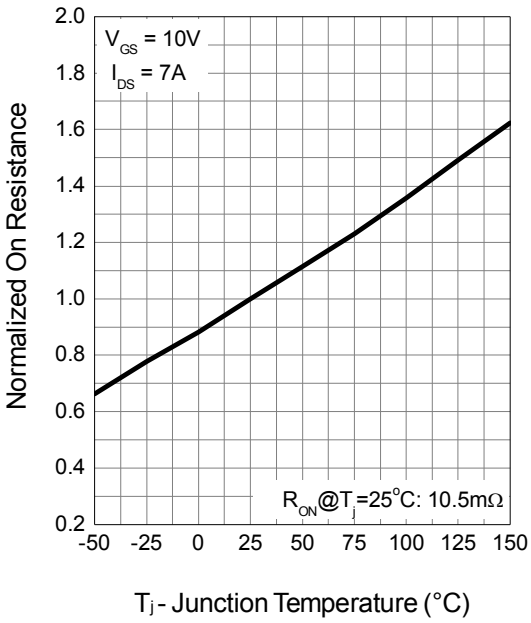


Gate Threshold Voltage

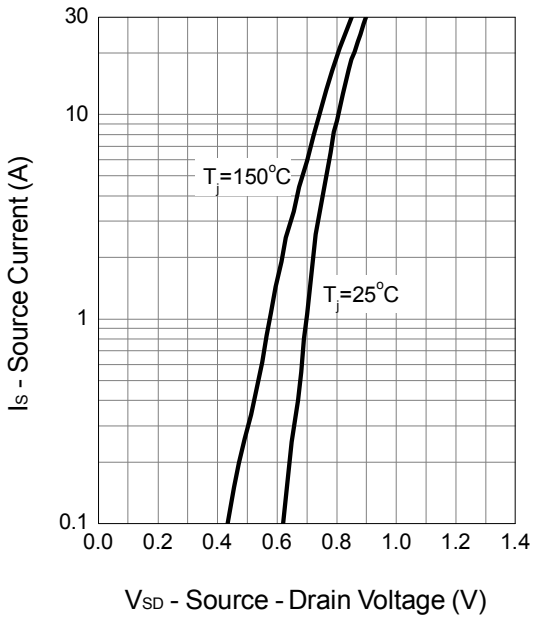


Typical Characteristics (Cont.)

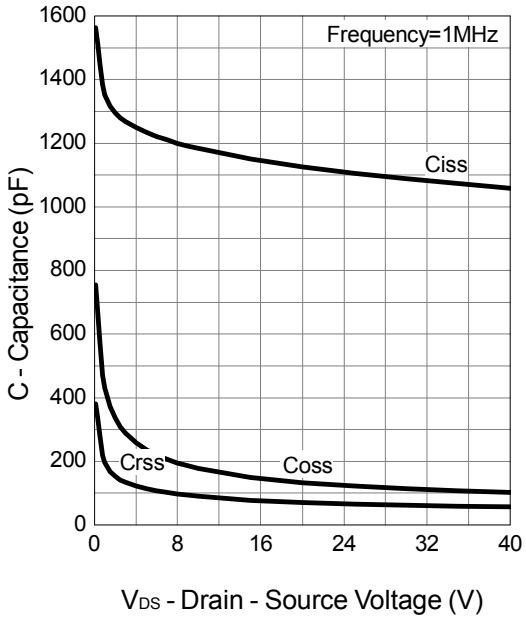
Drain-Source On Resistance



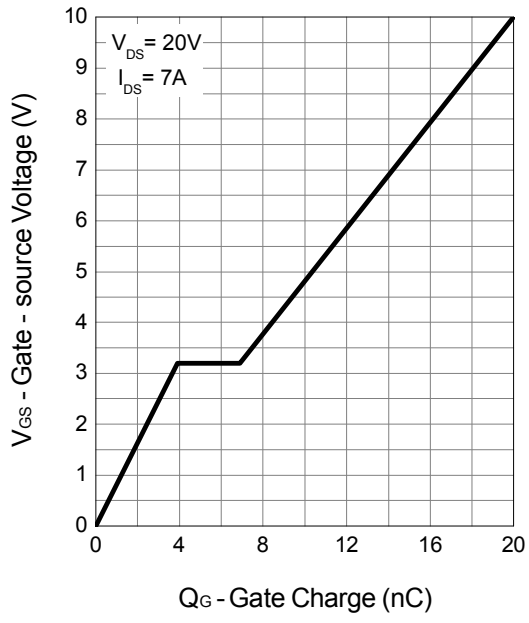
Source-Drain Diode Forward



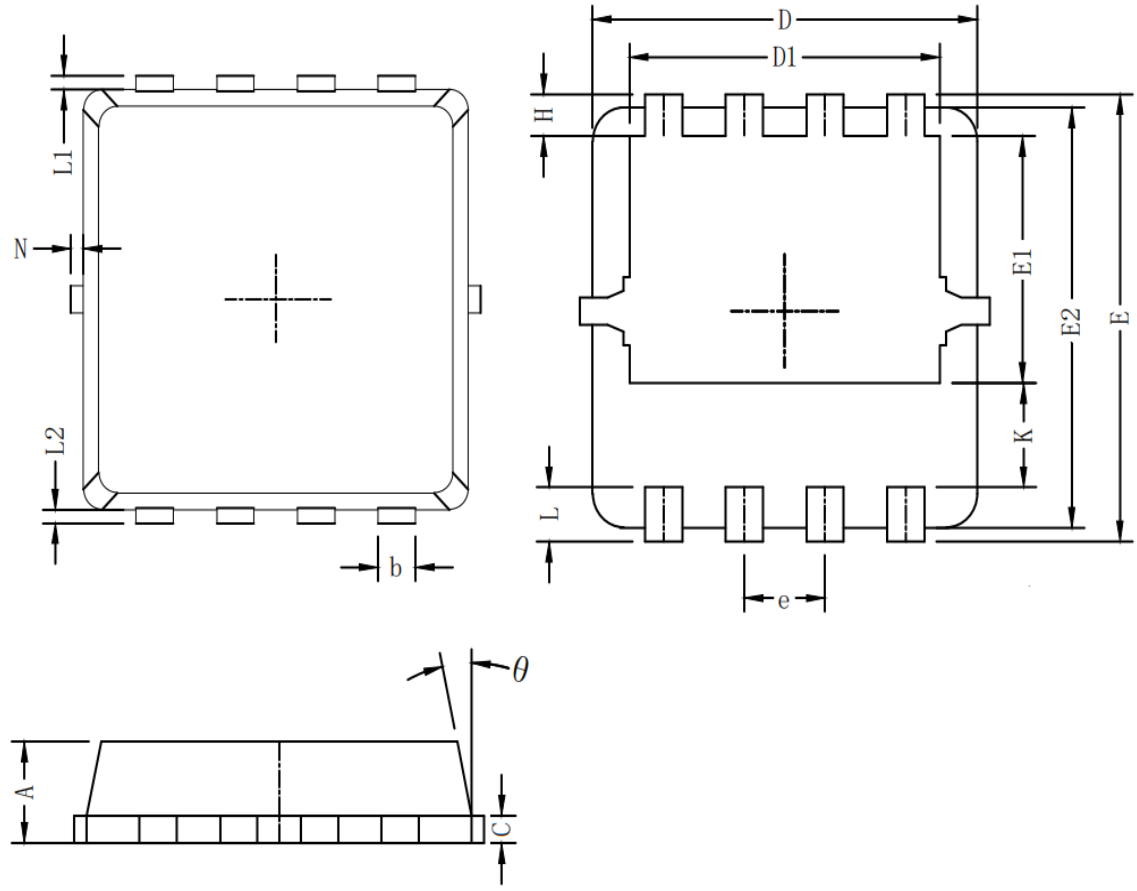
Capacitance



Gate Charge



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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