WSD4070DN33

N-Channel MOSFET

General Description

The WSD4070DN33 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 WSD4070DN33 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

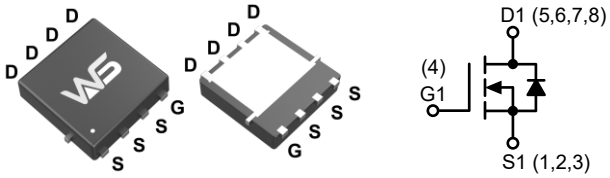
Product Summery

BV_{DSS}	$R_{DS(ON)}$	I_D
40V	4.5mΩ	68A

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 [7]	68	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V [7]	35	
I_{DM}@T_C=25°C	Pulsed Drain Current [3]	144	
E_{AS}	Avalanche Energy, Single Pulse (L=0.3mH)	80	mJ
I_{AS}	Avalanche Current	40	A
P_D@T_A=25°C	Total Power Dissipation [1]	3.1	W
P_D@T_A=70°C	Total Power Dissipation [1]	2.0	
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]	---	2.8	

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	---	4.5	5.5	mΩ
		V_{GS}=4.5V , I_D=5A	---	5.3	7.6	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250μA	1.4	1.9	2.4	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-6.06	---	mV/°C
I_{DSS}	Drain-Source Leakage Current	V_{DS}=40V , V_{GS}=0V , T_J=25°C	---	---	2.0	μA
		V_{DS}=40V , 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	---	67	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f = 1.0MHz	---	0.8	1.5	Ω
Q_g	Total Gate Charge (10V)	V_{DS}=20V , V_{GS}=10V , I_{DS}=20A	---	28	---	nC
Q_{gs}	Gate-Source Charge		---	3.9	---	
Q_{gd}	Gate-Drain Charge		---	6.0	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DS}=20V , V_{GS}=10V , R_G=3Ω , R_L=1Ω	---	7.2	---	ns
T_r	Rise Time		---	3.0	---	
$T_{d(off)}$	Turn-Off Delay Time		---	23	---	
T_f	Fall Time		---	3.5	---	
C_{iss}	Input Capacitance	V_{DS}=20V , V_{GS}=0V , f = 1.0MHz	---	2420	---	pF
C_{oss}	Output Capacitance		---	220	---	
C_{rss}	Reverse Transfer Capacitance		---	150	----	

Note:

1. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ t≤10s and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be u sed if the PCB allows it.
2. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
3. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low frequency and duty cycles to keep initial T_J=25°C.
4. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.
5. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.
6. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=150°C. The SOA curve provides a single pulse rating.
7. The maximum current rating is package limited.
8. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C.

Typical Characteristics

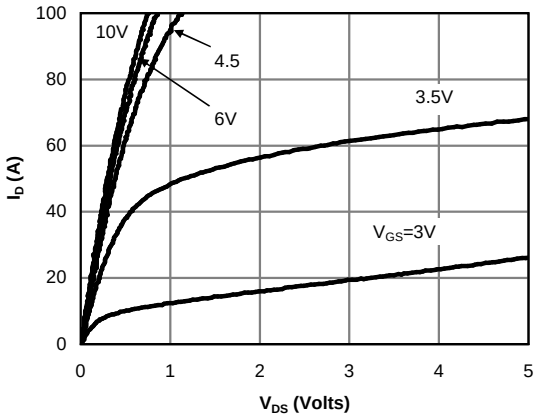


Fig 1: On-Region Characteristics (Note E)

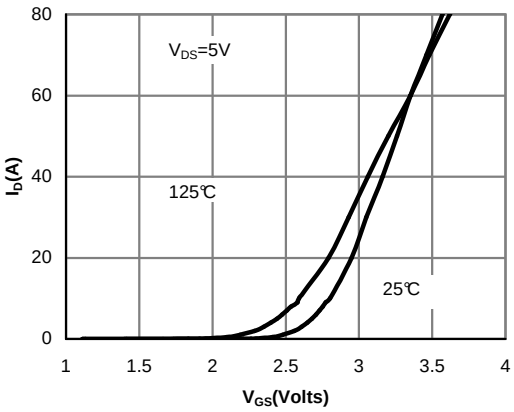


Figure 2: Transfer Characteristics (Note E)

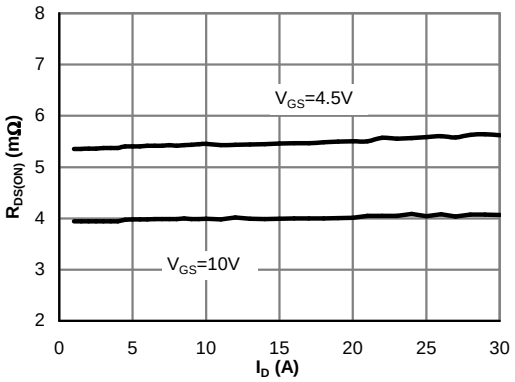


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

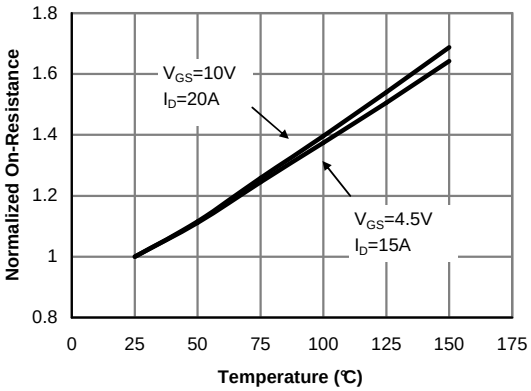


Figure 4: On-Resistance vs. Junction Temperature (Note E)

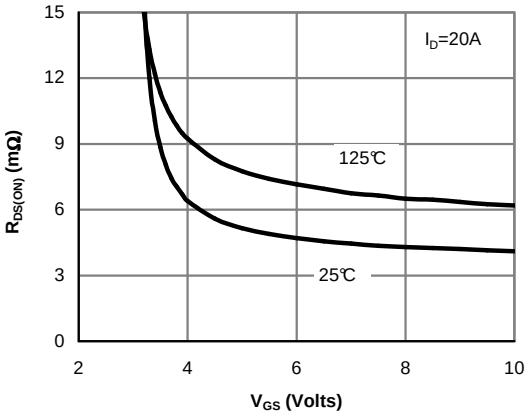


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

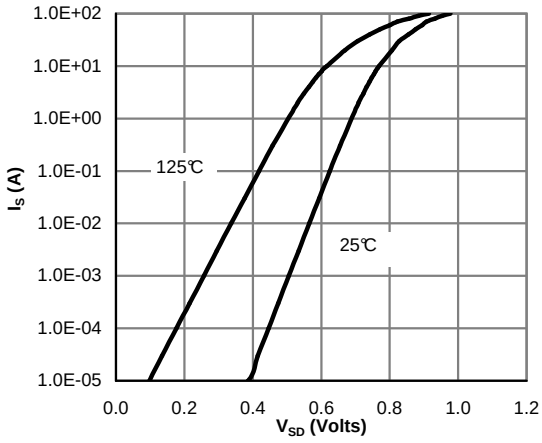


Figure 6: Body-Diode Characteristics (Note E)

Typical Characteristics (Cont.)

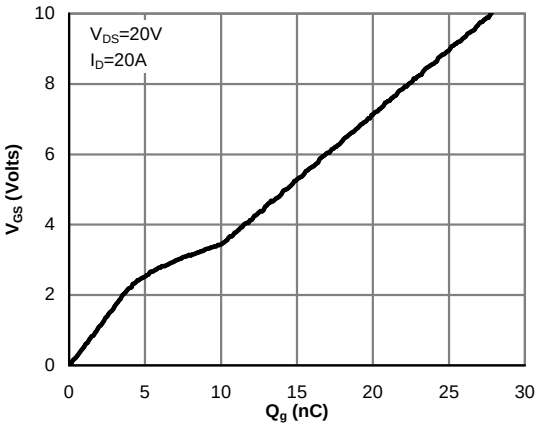


Figure 7: Gate-Charge Characteristics

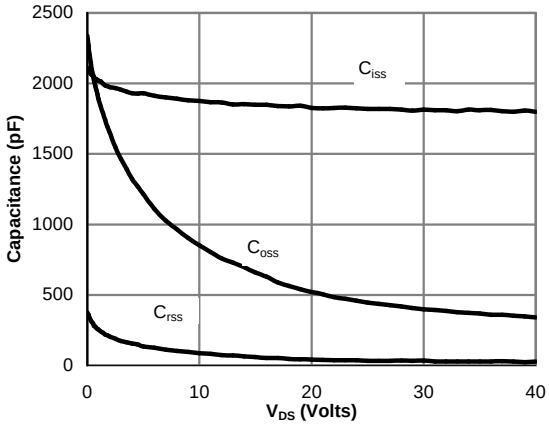


Figure 8: Capacitance Characteristics

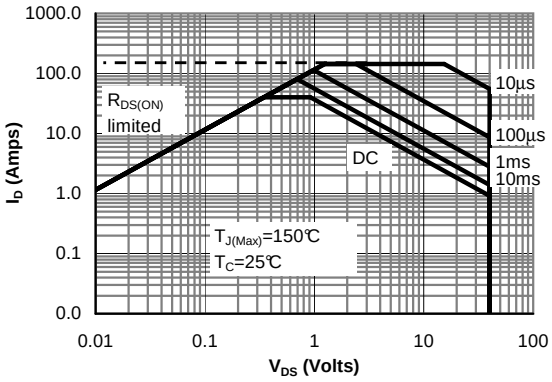


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

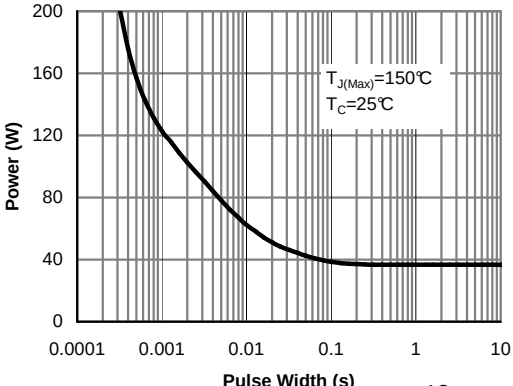


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

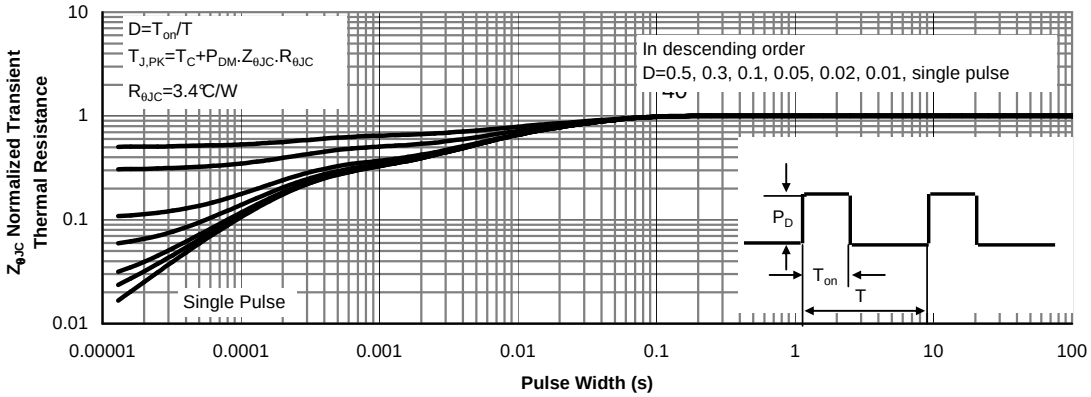


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Typical Characteristics (Cont.)

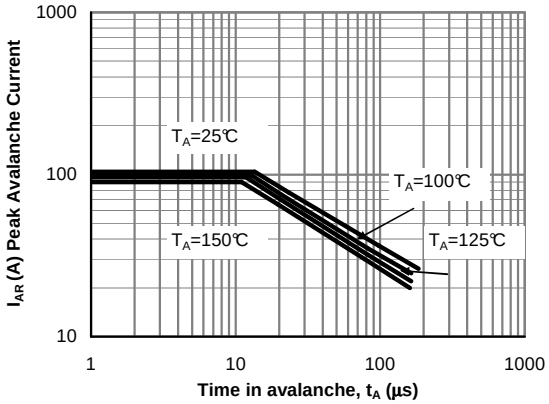


Figure 12: Single Pulse Avalanche capability (Note C)

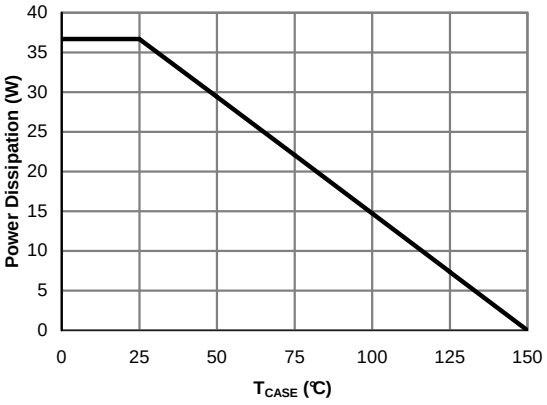


Figure 13: Power De-rating (Note F)

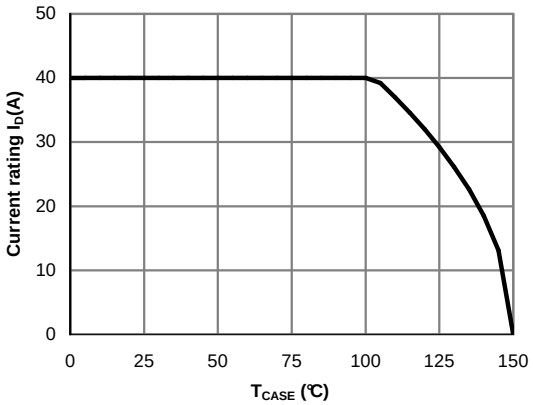


Figure 14: Current De-rating (Note F)

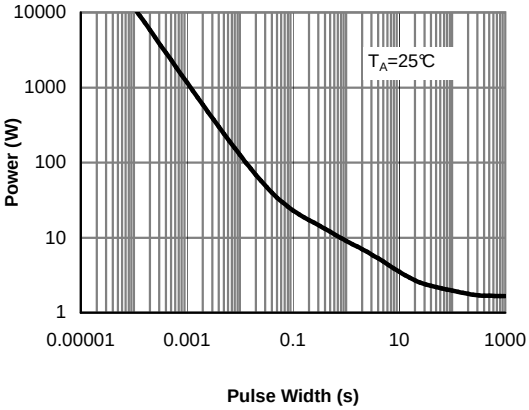


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

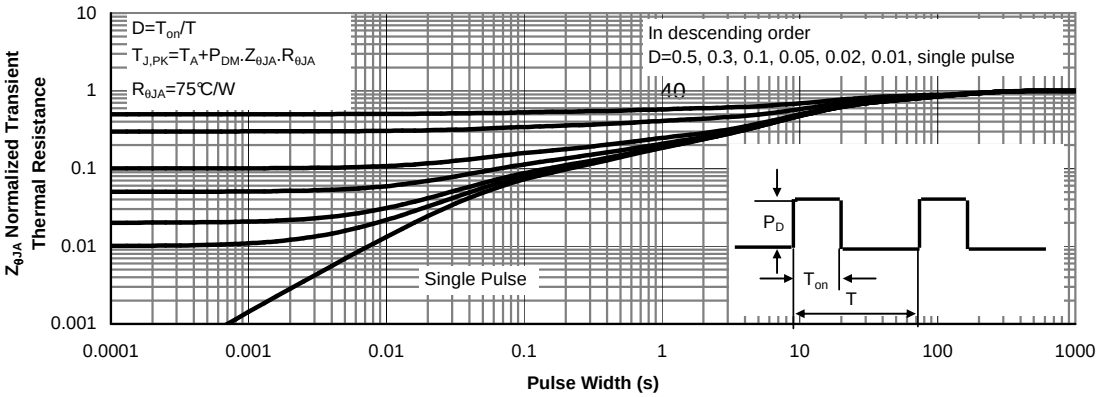
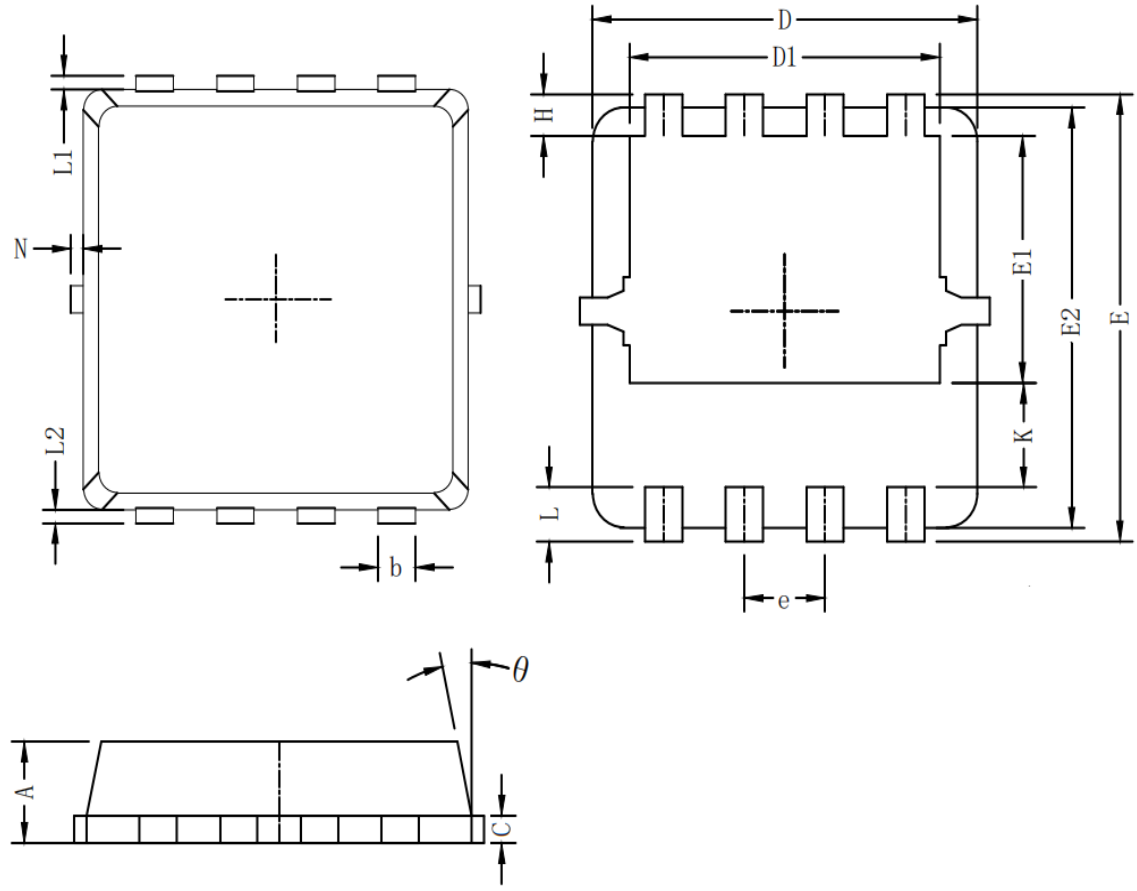


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

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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