WSD2022DN33

Dual N-Channel MOSFET

General Description

The WSD2022DN33 is the highest performance trench Dual 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 WSD2022DN33 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

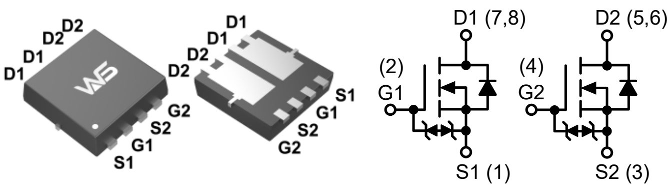
Product Summery

BV_{DSS}	$R_{DS(ON)}$	I_D
20V	16.2mΩ	22A

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	20	V
V_{GS}	Gate-Source Voltage	±8	
I_D@T_C=25°C	Continuous Drain Current, V_{GS} @ 10V [1]	22	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V [1]	4.8	
I_D@T_A=25°C	Continuous Drain Current, V_{GS} @ 10V [1]	7.4	
I_D@T_A=70°C	Continuous Drain Current, V_{GS} @ 10V [1]	5.7	
I_{DM}	Pulsed Drain Current [2]	24	
E_{AS}	Single Pulse Avalanche Energy [3]	15	mJ
I_{AS}	Avalanche Current	16	A
P_D@T_C=25°C	Power Dissipation [4]	2.5	W
P_D@T_A=25°C	Power Dissipation [4]	1.6	
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]	---	75	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case [1]	---	8.5	

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	20	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C, I_D=1mA	---	0.0332	---	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance [2]	V_{GS}=4.5V , I_D=8A	---	16.2	21	mΩ
		V_{GS}=2.5V , I_D=7A	---	19.4	25	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, I_D=250μA	0.4	0.52	1.0	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.08	---	mV/°C
I_{DSS}	Drain-Source Leakage Current	V_{DS}=20V , V_{GS}=0V , T_J=25°C	---	---	1.0	μA
		V_{DS}=20V , V_{GS}=0V , T_J=55°C	---	---	5.0	
I_{GSS}	Gate-Source Leakage Current	V_{DS}=0V , V_{GS}=±8V	---	---	±10	μA
g_{fs}	Forward Transconductance	V_{DS}=5V , I_D=6.5A	---	13	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f = 1.0MHz	---	2.2	3.0	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=10V , V_{GS}=4.5V , I_D=8A	---	13.8	17.94	nC
Q_{gs}	Gate-Source Charge		---	4.1	5.33	
Q_{gd}	Gate-Drain Charge		---	5.6	7.28	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=10V , V_{GEN}=5V , R_G=3Ω I_D=1A , R_L=1.5Ω	---	6.2	12.4	ns
T_r	Rise Time		---	12.7	25.4	
$T_{d(off)}$	Turn-Off Delay Time		---	51.7	103.4	
T_f	Fall Time		---	16	32	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f = 1.0MHz	---	1160	---	pF
C_{oss}	Output Capacitance		---	104	---	
C_{rss}	Reverse Transfer Capacitance		---	29	---	

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}=7.5A	15	---	---	mJ

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]		---	---	25	A
V_{SD}	Diode Forward Voltage [2]	V_{GS}=0V , I_S=2A , T_J=25°C	---	---	1.0	V
t_{rr}	Reverse Recovery Time	I_F=7.5A, dI/dt=100A/μs,T_J=25°C	---	13	---	ns
Q_{rr}	Reverse Recovery Charge		---	3	---	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}=7.5A
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

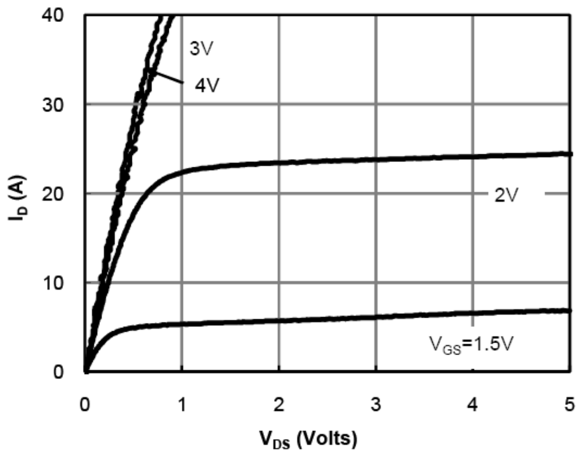


Fig 1: On-Region Characteristics

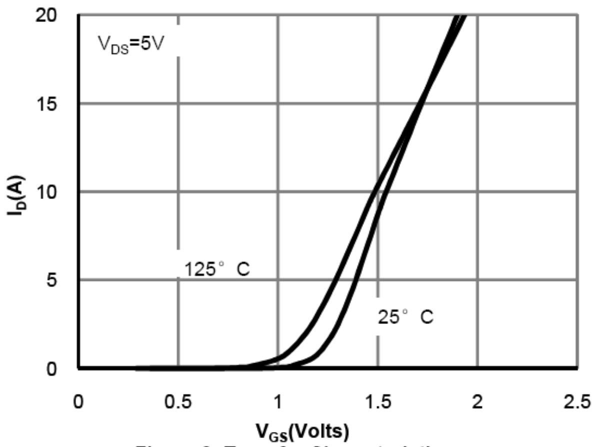


Figure 2: Transfer Characteristics

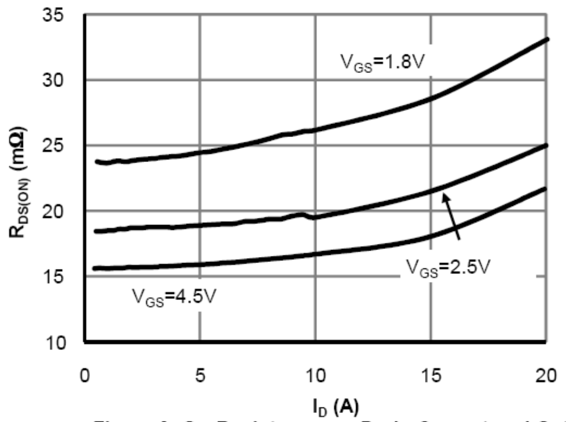


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

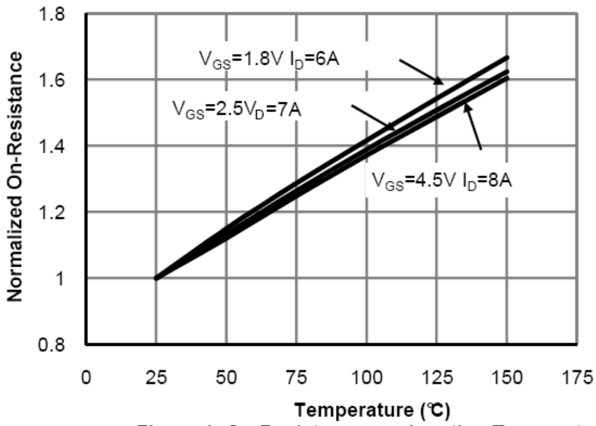


Figure 4: On-Resistance vs. Junction Temperature

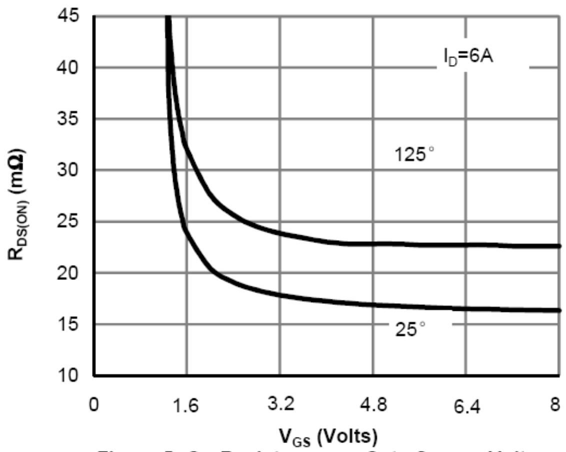


Figure 5: On-Resistance vs. Gate-Source Voltage

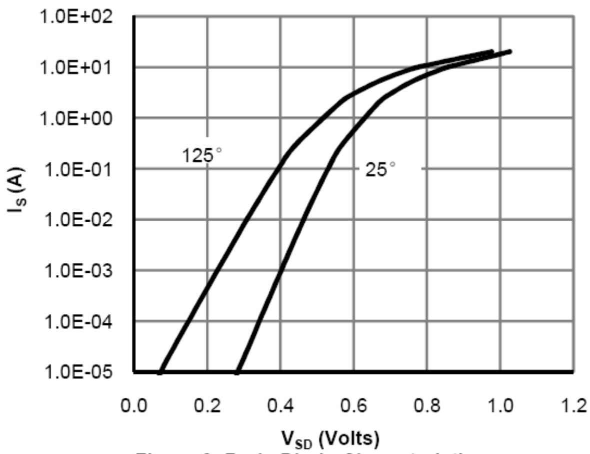


Figure 6: Body-Diode Characteristics

Typical Characteristics (Cont.)

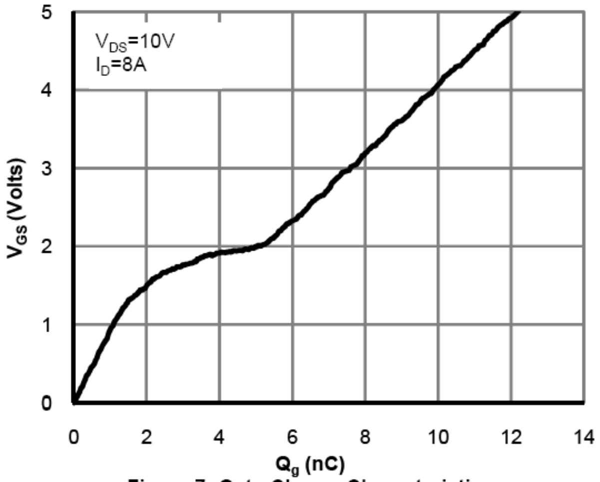


Figure 7: Gate-Charge Characteristics

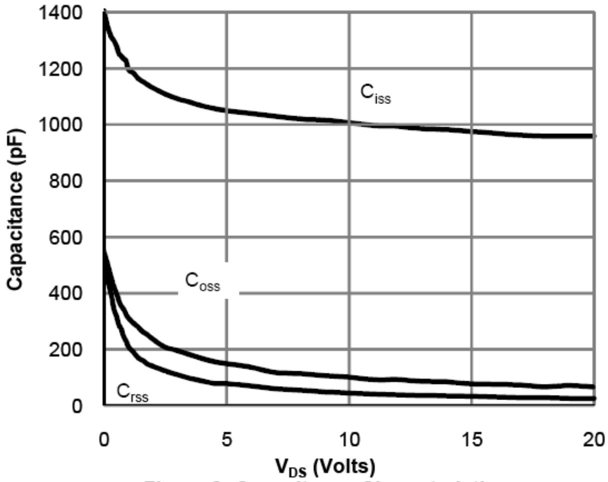


Figure 8: Capacitance Characteristics

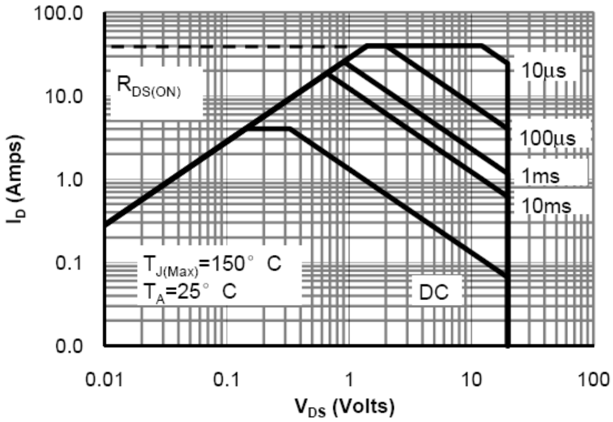


Figure 9: Maximum Forward Biased Safe Operating Area

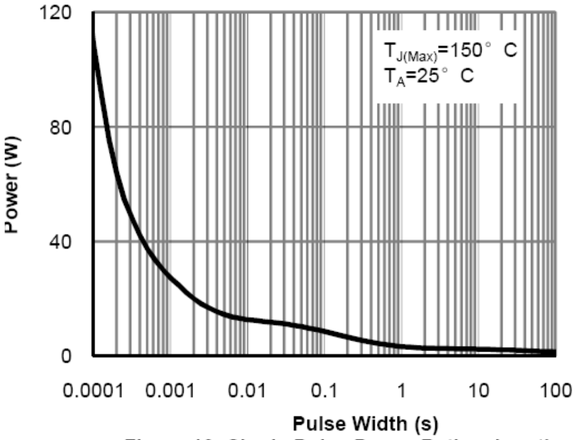


Figure 10: Single Pulse Power Rating Junction-to-Case

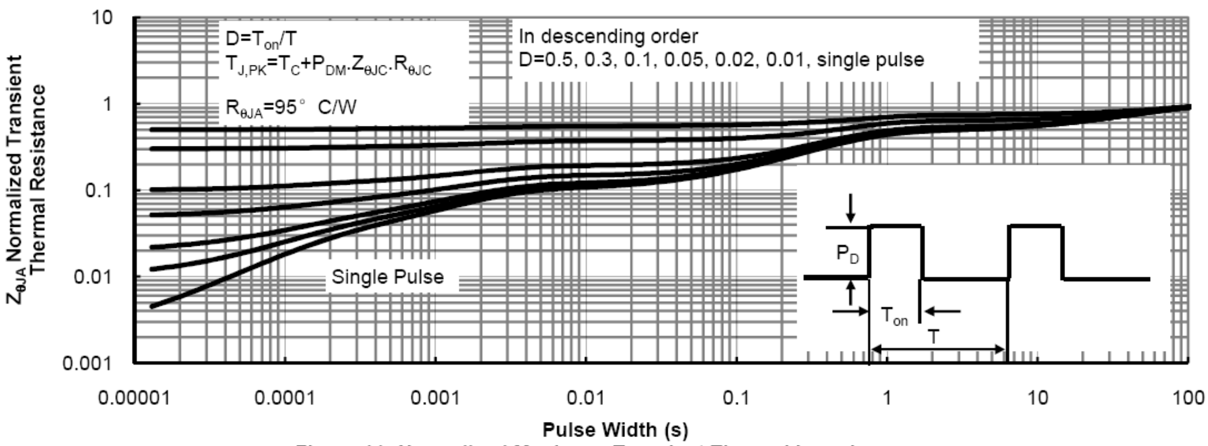
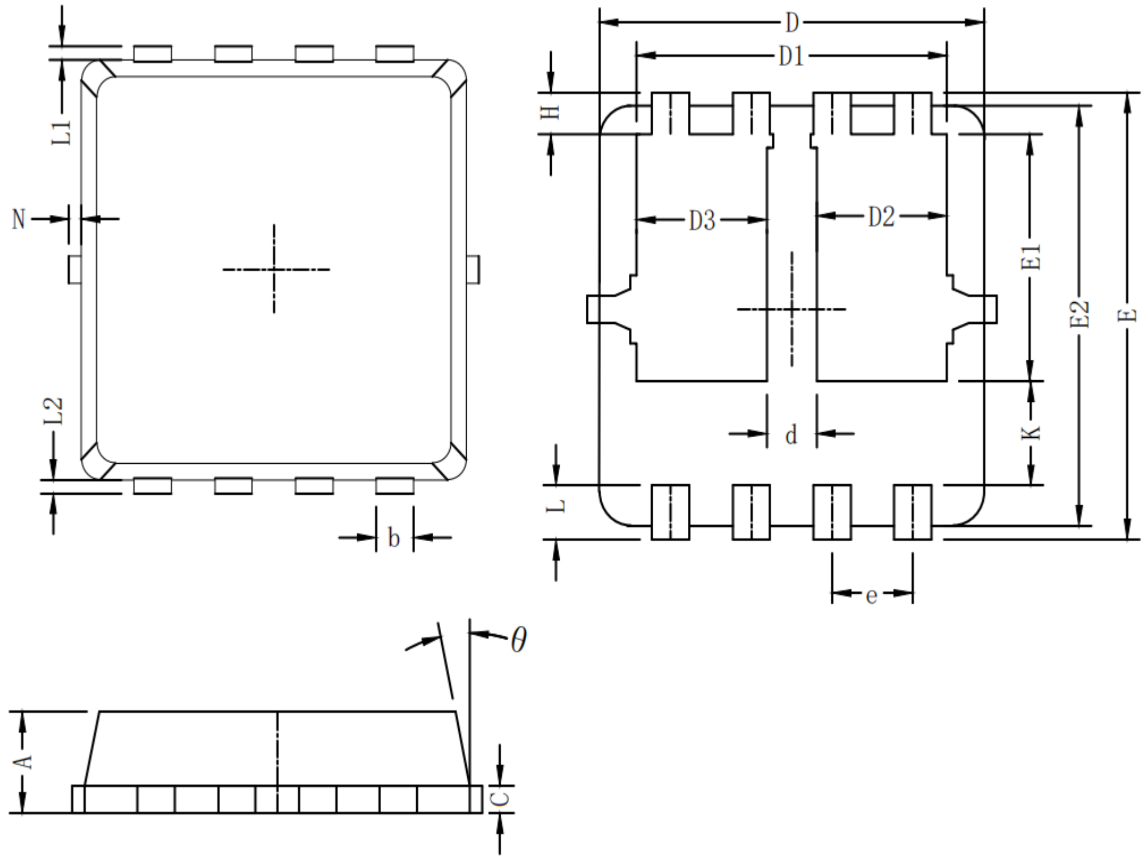


Figure 11: Normalized Maximum Transient Thermal Impedance

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
D2/D3	0.8	1	1.2
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
d	0.3	0.4	0.5

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