General Description

The WSD2209DN33 is the highest performance trench P-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 WSD2209DN33 meet the RoHS and Green Product requirement with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Green Device Available

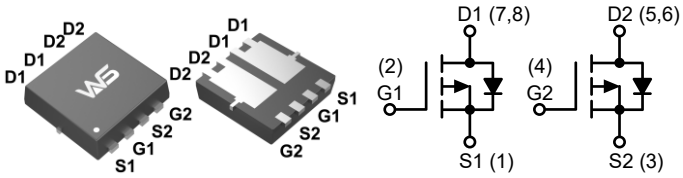
Product Summery

BV_{DSS}	$R_{DS(ON)}$	I_D
-20V	28mΩ	-7.5A

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
		10s	Steady State	
V_{DS}	Drain-Source Voltage	-20		V
V_{GS}	Gate-Source Voltage	±10		
I_D@T_C=25°C	Continuous Drain Current, V_{GS} @ 10V [1]	-7.5		A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V [1]	-4.5		
I_D@T_A=25°C	Continuous Drain Current, V_{GS} @ 10V [1]	-36	-30	
I_D@T_A=70°C	Continuous Drain Current, V_{GS} @ 10V [1]	-28	-23	
I_{DM}	Pulsed Drain Current [2]	-25		
E_{AS}	Single Pulse Avalanche Energy [3]	---		mJ
I_{AS}	Avalanche Current	---		A
P_D@T_C=25°C	Total Power Dissipation [4]	2.5		W
P_D@T_A=25°C	Total Power Dissipation [4]	1.6	1.7	
T_{STG}	Storage Temperature Range	-55 to 150		°C
T_J	Operating Junction Temperature Range	-55 to 150		

Electrical Characteristics (T_A=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	---	-0.132	---	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-4.5V , I_D=-4A	---	28	33	mΩ
		V_{GS}=-2.5V , I_D=-3A	---	37	45	
		V_{GS}=-1.8V , I_D=-2A	---	50	68	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=-250μA	-0.3	-0.6	-1.0	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.4	---	mV/°C
I_{DSS}	Zero Gate Voltage Drain 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 Leakage Current	V_{DS}=0V , V_{GS}=±8V	---	10	---	μA
g_{fs}	Forward Transconductance	V_{DS}=-5V , I_D=-20A	---	9	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f = 1.0MHz	---	3	---	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}=-4.5V , R_G=3Ω , I_D=-1A , R_L=0.5Ω	---	6.2	---	ns
T_r	Rise Time		---	12.7	---	
$T_{d(off)}$	Turn-Off Delay Time		---	51.7	---	
T_f	Fall Time		---	16	---	
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	---	

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%

Typical Characteristics

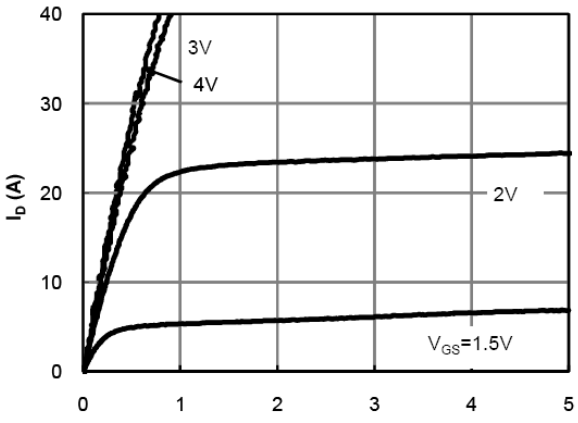


Fig 1: On-Region Characteristics

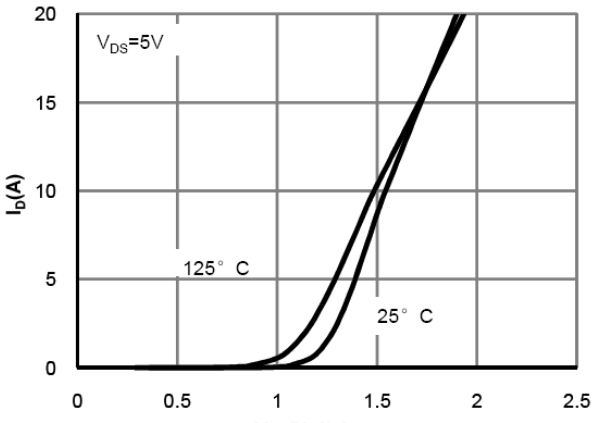


Figure 2: Transfer Characteristics

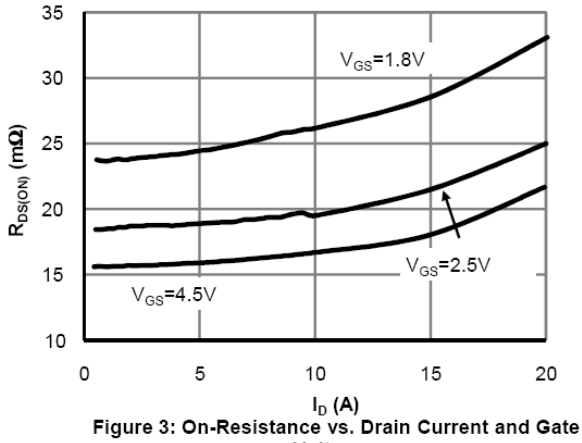


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

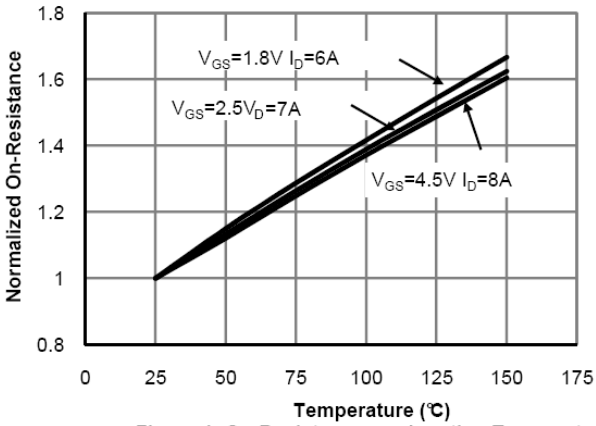


Figure 4: On-Resistance vs. Junction Temperature

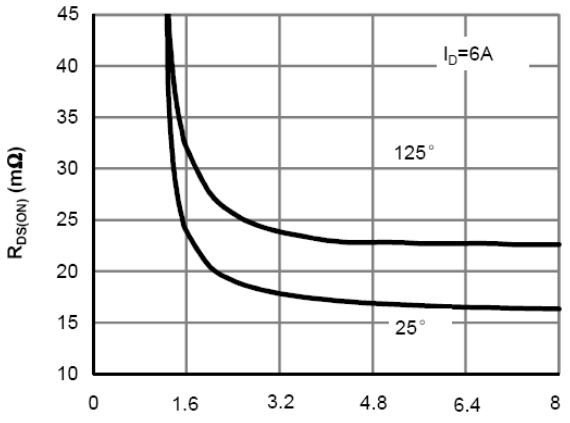


Figure 5: On-Resistance vs. Gate-Source Voltage

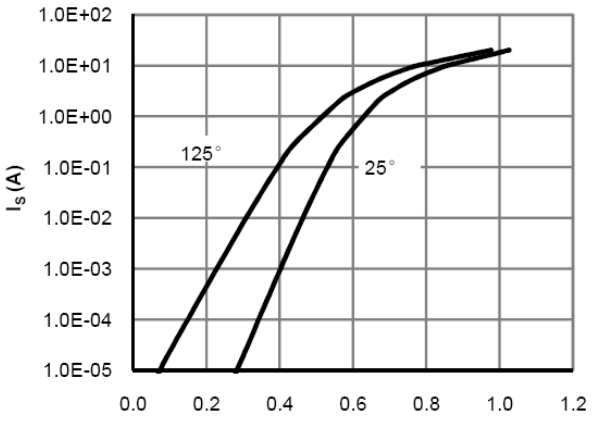


Figure 6: Body-Diode Characteristics

Typical Characteristics (Cont.)

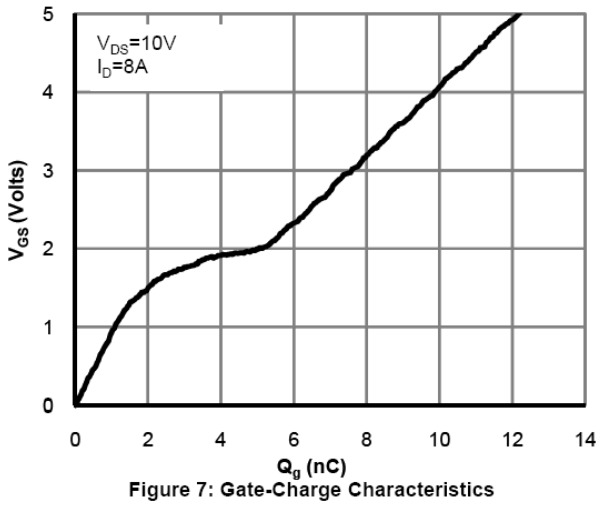


Figure 7: Gate-Charge Characteristics

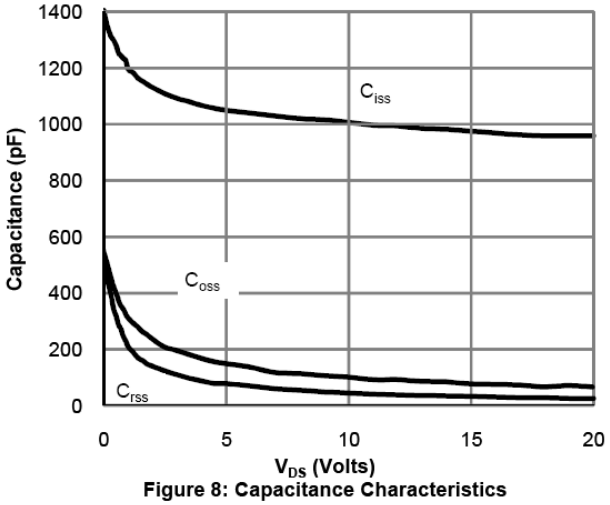


Figure 8: Capacitance Characteristics

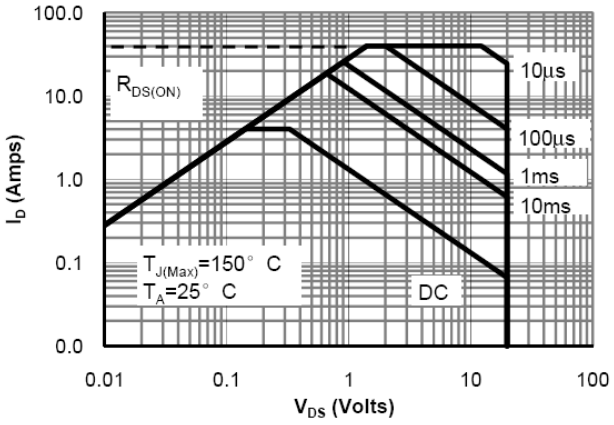


Figure 9: Maximum Forward Biased Safe Operating Area

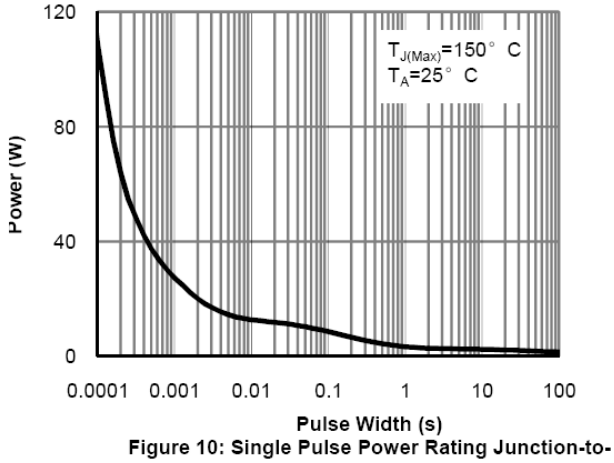


Figure 10: Single Pulse Power Rating Junction-to-Case

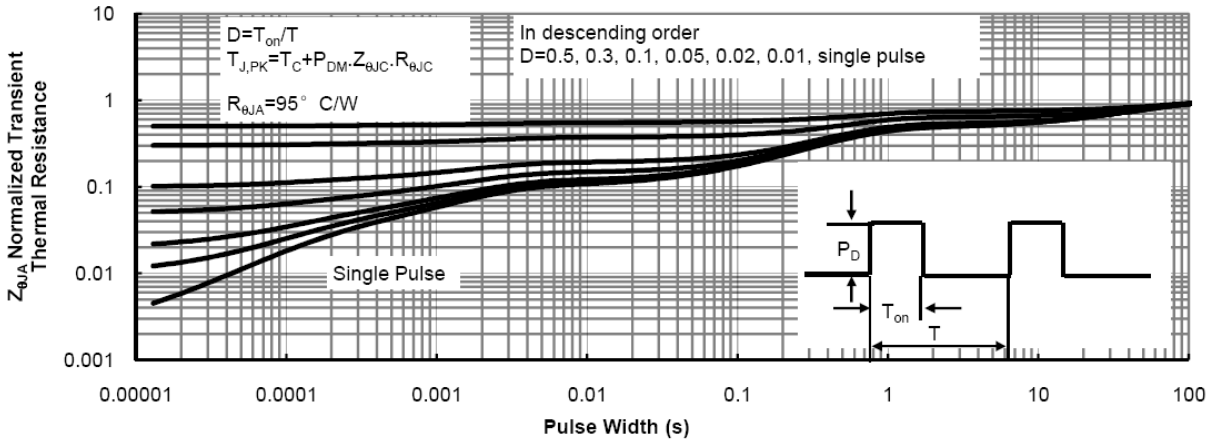
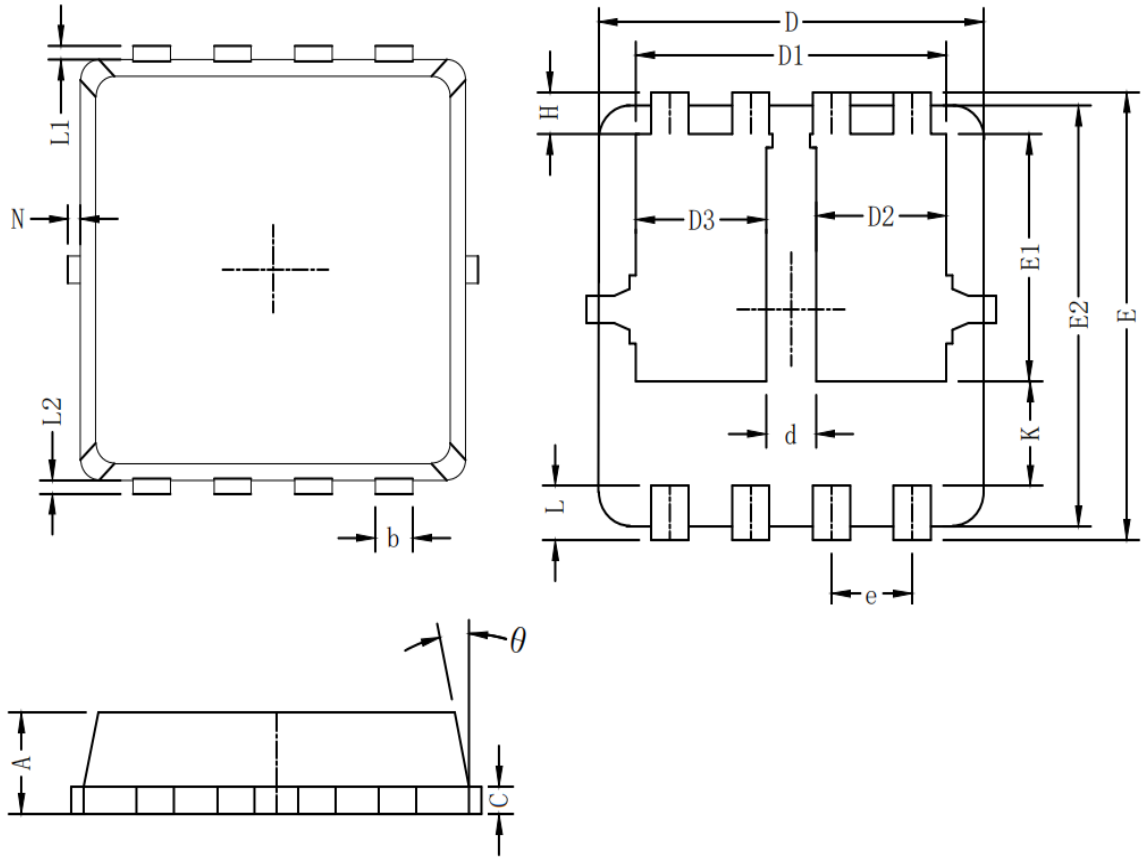


Figure 11: Normalized Maximum Transient Thermal Impedance

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

Attention

1, Any and all Winsok power products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life−support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your Winsok power representative nearest you before using any Winsok power products described or contained herein in such applications.

2, Winsok power assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all Winsok power products described or contained herein.

3, Specifications of any and all Winsok power products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer’s products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer’s products or equipment.

4, Winsok power Semiconductor CO., LTD. strives to supply high−quality high−reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.

5, In the event that any or all Winsok power products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.

7, Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. Winsok power believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

8, Any and all information described or contained herein are subject to change without notice due to product/technology improvement,etc. When designing equipment, refer to the "Delivery Specification" for the Winsok power product that you Intend to use.

9, this catalog provides information as of Sep.2014. Specifications and information herein are subject to change without notice.