WSD2050DN33

N-Channel MOSFET

General Description

The WSD2050DN33 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 WSD2050DN33 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

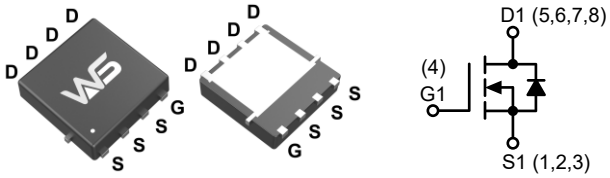
Product Summery

BV_{DSS}	$R_{DS(ON)}$	I_D
20V	8.2mΩ	40A

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	±12	
I_D@T_C=25°C	Continuous Drain Current, V_{GS} @ 10V [1]	40	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V [1]	28	
I_{DM}	Pulsed Drain Current [2]	85	
I_{AS}	Avalanche Current	14	
P_D@T_C=25°C	Power Dissipation [4]	28	W
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
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient [1] (t ≤10s)	---	50	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case [1]	---	4.7	

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
$R_{DS(ON)}$	Static Drain-Source On-Resistance [2]	V_{GS}=10V , I_D=7A	---	8.2	14	mΩ
		V_{GS}=4.5V , I_D=6A	---	9.5	16	
		V_{GS}=2.5V , I_D=5A	---	12.5	20	
		V_{GS}=1.8V , I_D=2A	---	18	28	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250μA	0.4	0.6	1.0	V
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}=±12V	---	---	±100	nA
g_{fs}	Forward Transconductance	V_{DS}=5V , I_D=7A	20	---	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f = 1.0MHz	---	1.0	1.5	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=15V , V_{GS}=10V , I_D=7A	---	10	12	nC
Q_{gs}	Gate-Source Charge		---	3.5	4.1	
Q_{gd}	Gate-Drain Charge		---	4.2	4.7	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V , V_{GS}=10V , R_G=6Ω I_D=1A , R_L=15Ω	---	9	17	ns
T_r	Rise Time		---	11	23	
$T_{d(off)}$	Turn-Off Delay Time		---	29	52	
T_f	Fall Time		---	7	12	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f = 1.0MHz	---	1200	1400	pF
C_{oss}	Output Capacitance		---	185	220	
C_{rss}	Reverse Transfer Capacitance		---	113	140	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current [1,6]	V_G=V_D=0V , Force Current	---	---	20	A
V_{SD}	Diode Forward Voltage [2]	V_{GS}=0V , I_S=2A , T_J=25°C	---	---	1.2	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 ≤ 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}=20A
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

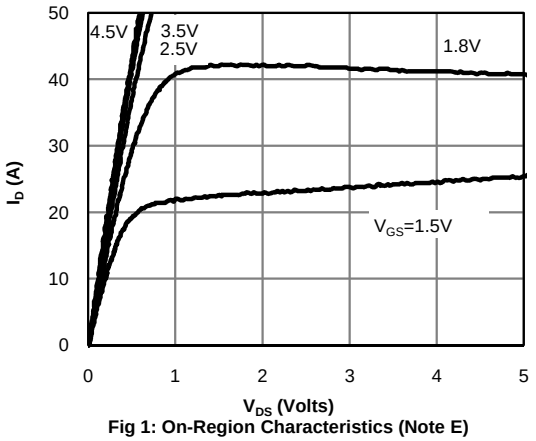


Fig 1: On-Region Characteristics (Note E)

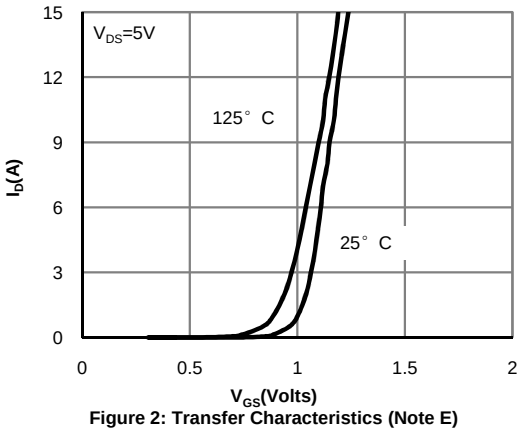


Figure 2: Transfer Characteristics (Note E)

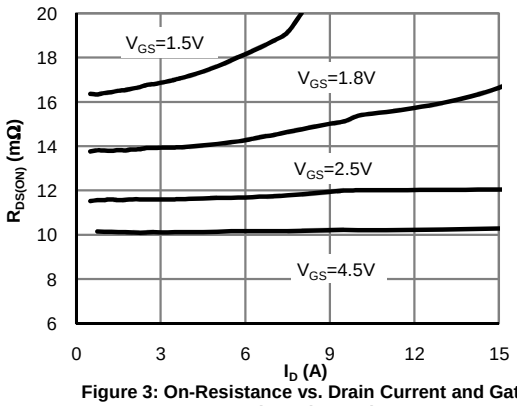


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

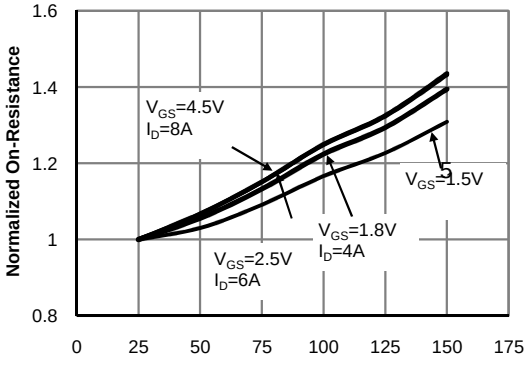


Figure 4: On-Resistance vs. Junction Temperature (Note E)

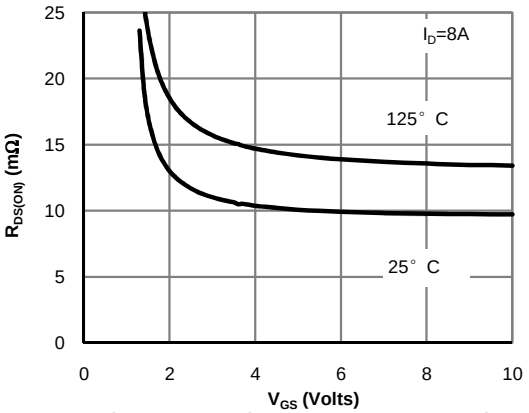


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

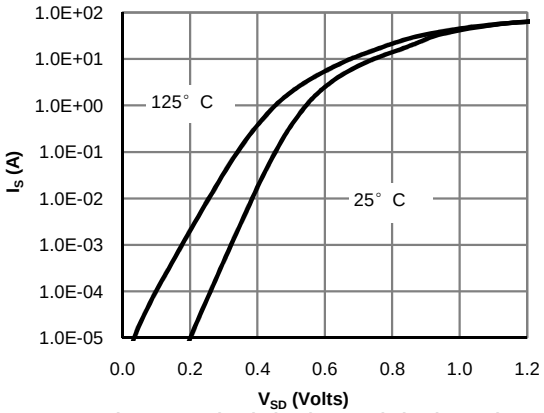


Figure 6: Body-Diode Characteristics (Note E)

Typical Characteristics (Cont.)

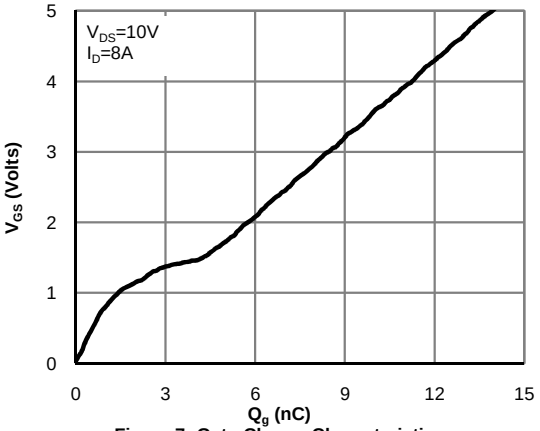


Figure 7: Gate-Charge Characteristics

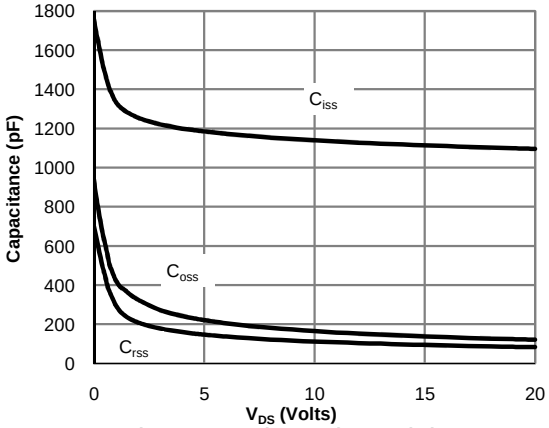


Figure 8: Capacitance Characteristics

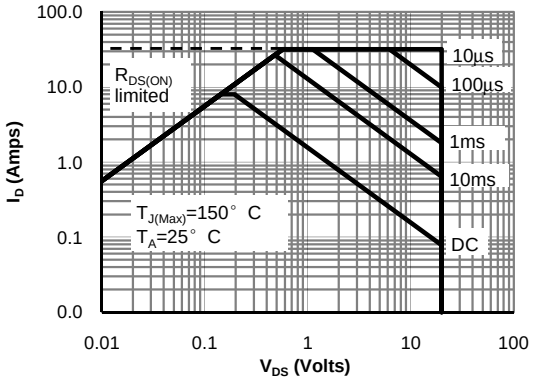


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

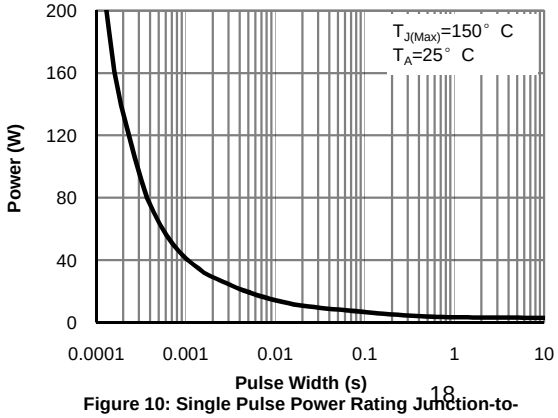


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

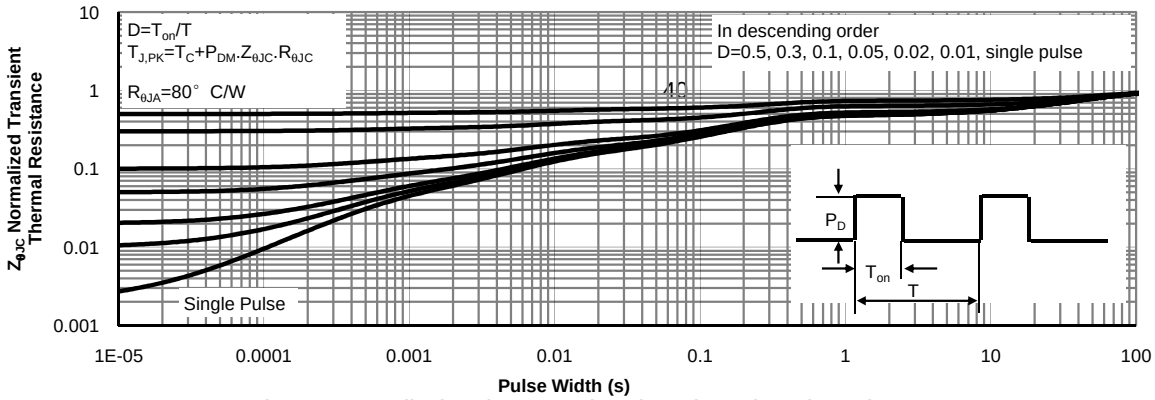
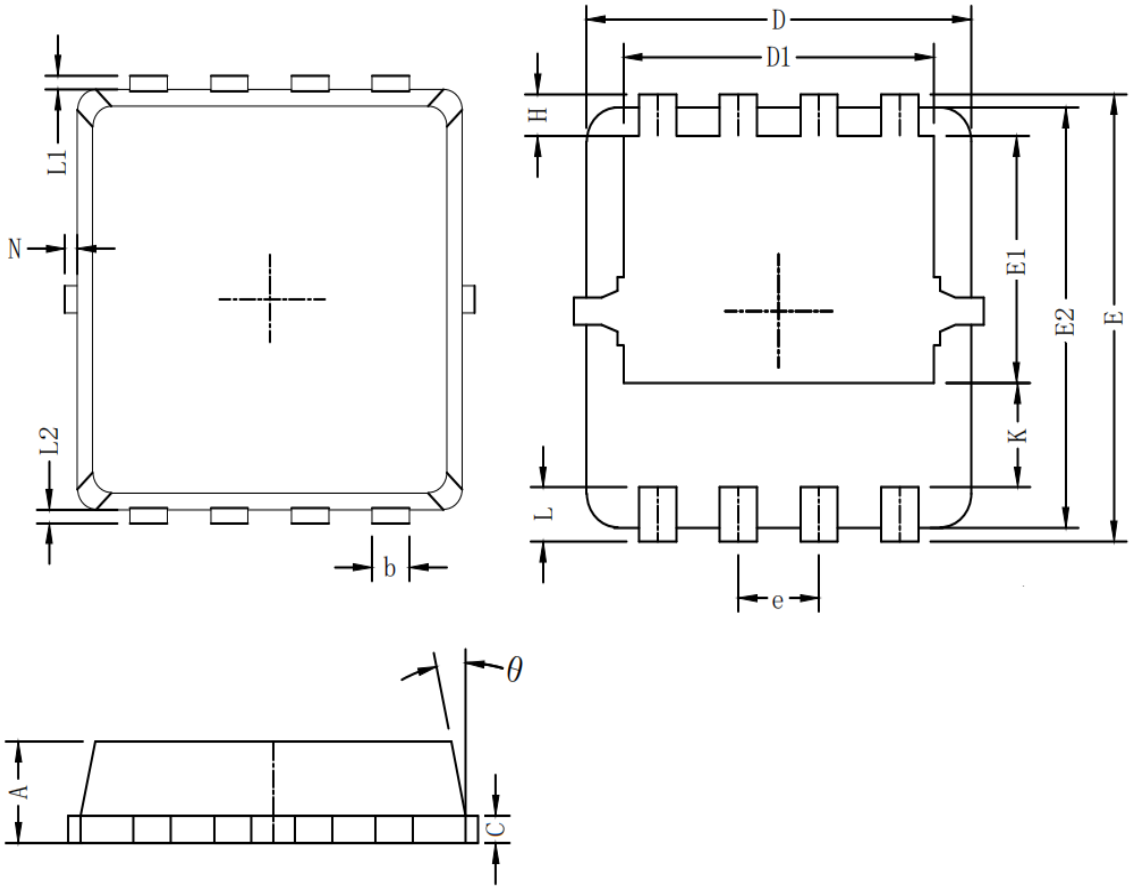


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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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