

## General Description

The WSD3028DN33 is the highest performance trench 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 WSD3028DN33 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

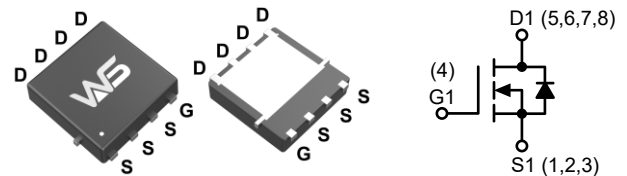
## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
30V	25mΩ	19A

## Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

## DFN3X3-8S Pin Configuration



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	±20	
$I_D@T_C=25^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	25	A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	18	
$I_D@T_A=25^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	19	
$I_D@T_A=70^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	15	
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	40	
$E_{AS}$	Single Pulse Avalanche Energy <sup>3</sup>	21	mJ
$I_{AS}$	Avalanche Current	15	A
$P_D@T_C=25^{\circ}C$	Power Dissipation <sup>4</sup>	5	W
$P_D@T_A=25^{\circ}C$	Power Dissipation <sup>4</sup>	2.5	
$T_{STG}$	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 <sup>1</sup>	---	50	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case <sup>1</sup>	---	4	

**Electrical Characteristics (T<sub>J</sub>=25°C, Unless Otherwise Noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.0232	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =12A	---	22	25	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A	---	32	35	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA	1.2	1.6	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-6.08	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1.0	μA
		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5.0	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =6A	---	6.5	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f = 1.0MHz	---	2.5	3.3	Ω
Q <sub>g</sub>	Total Gate Charge (4.5V)	V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A	---	4.1	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	1	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	2.1	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =15V, V <sub>GEN</sub> =10V, R <sub>G</sub> =6Ω I <sub>D</sub> =1A, R <sub>L</sub> =15Ω	---	2	---	ns
T <sub>r</sub>	Rise Time		---	4	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	15.8	---	
T <sub>f</sub>	Fall Time		---	4	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f = 1.0MHz	---	360	---	pF
C <sub>OSS</sub>	Output Capacitance		---	55	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	46	---	

**Guaranteed Avalanche Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>5</sup>	V <sub>DD</sub> =25V, L=0.1mH, I <sub>AS</sub> =23A	21	---	---	mJ

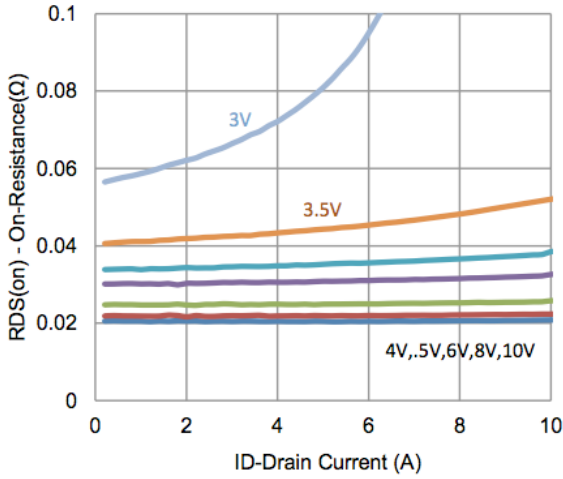
**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	5	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,6</sup>		---	---	22	
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1.0	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =20A, dI/dt=100A/μs, T <sub>J</sub> =25°C	---	16.5	---	ns
Q <sub>rr</sub>	Reverse Recovery Charge		---	10	---	nC

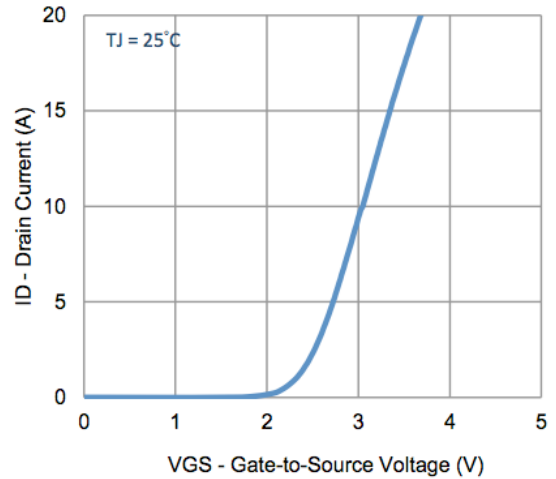
Note:

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper, t<10sec.
- The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
- The E<sub>AS</sub> data shows Max. rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=23A
- The power dissipation is limited by 150°C junction temperature.
- The Min. value is 100% E<sub>AS</sub> tested guarantee.
- The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

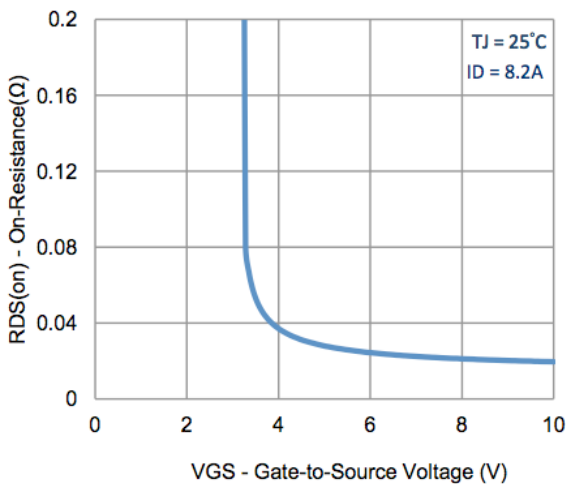
**Typical Characteristics**



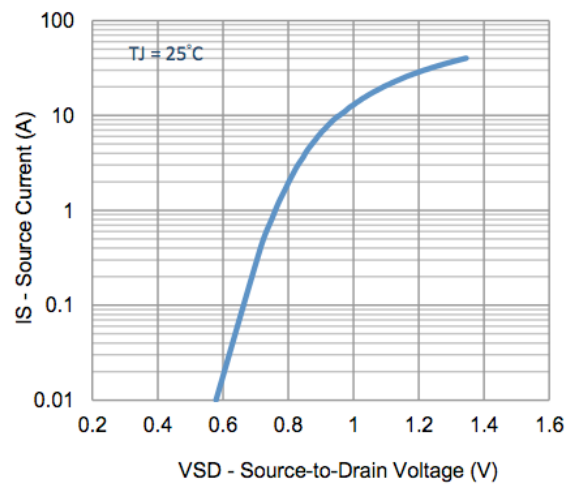
**1. On-Resistance vs. Drain Current**



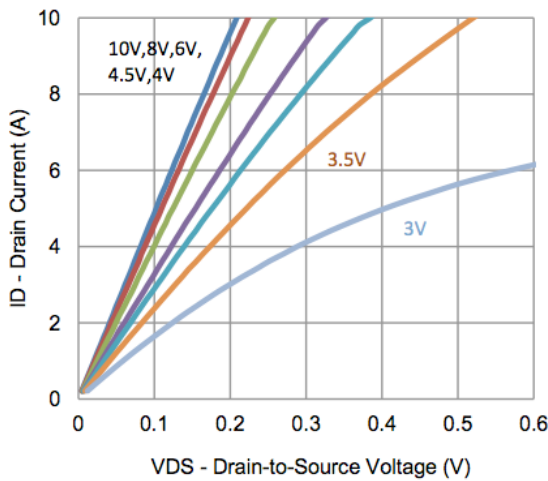
**2. Transfer Characteristics**



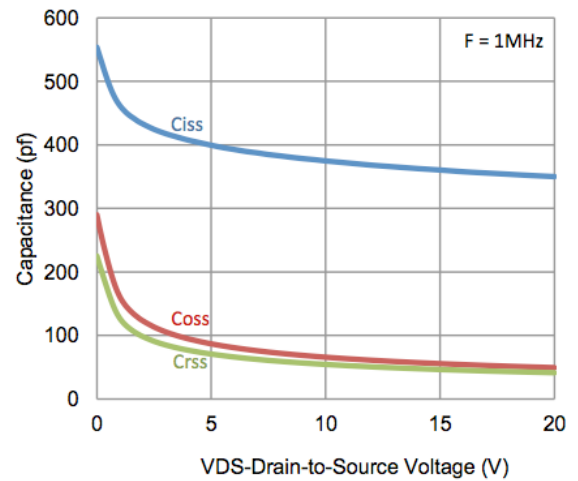
**3. On-Resistance vs. Gate-to-Source Voltage**



**4. Drain-to-Source Forward Voltage**

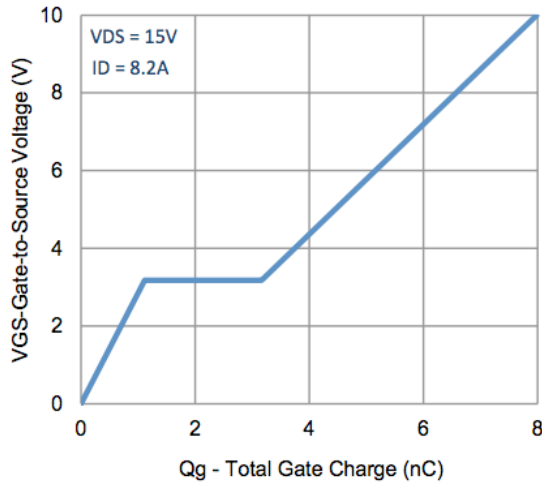


**5. Output Characteristics**

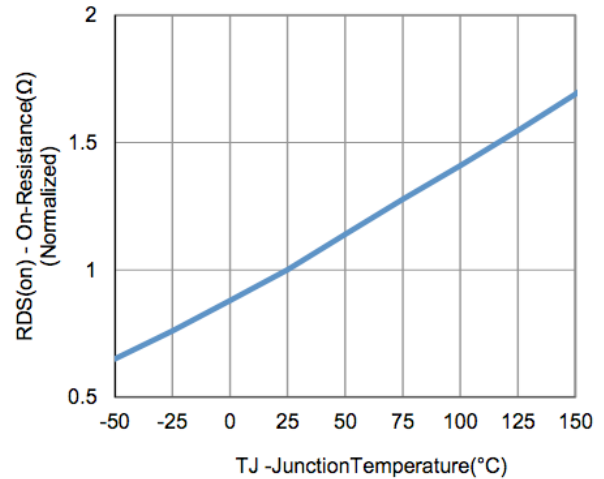


**6. Capacitance**

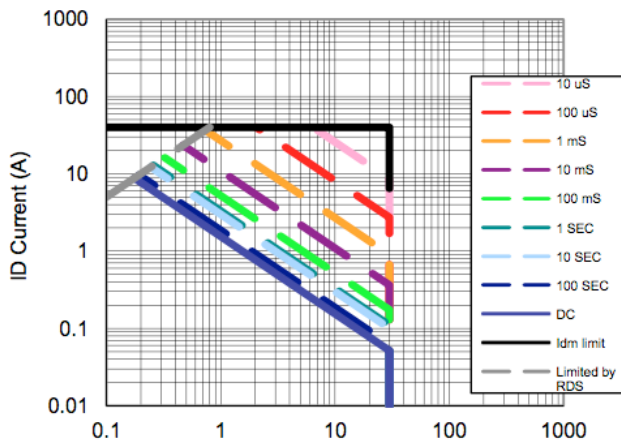
**Typical Characteristics (Cont.)**



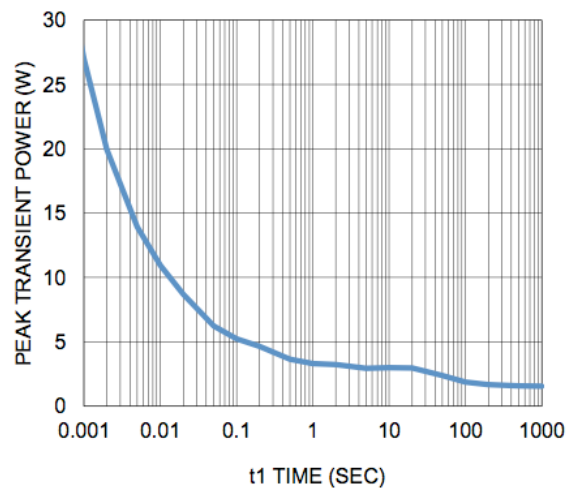
**7. Gate Charge**



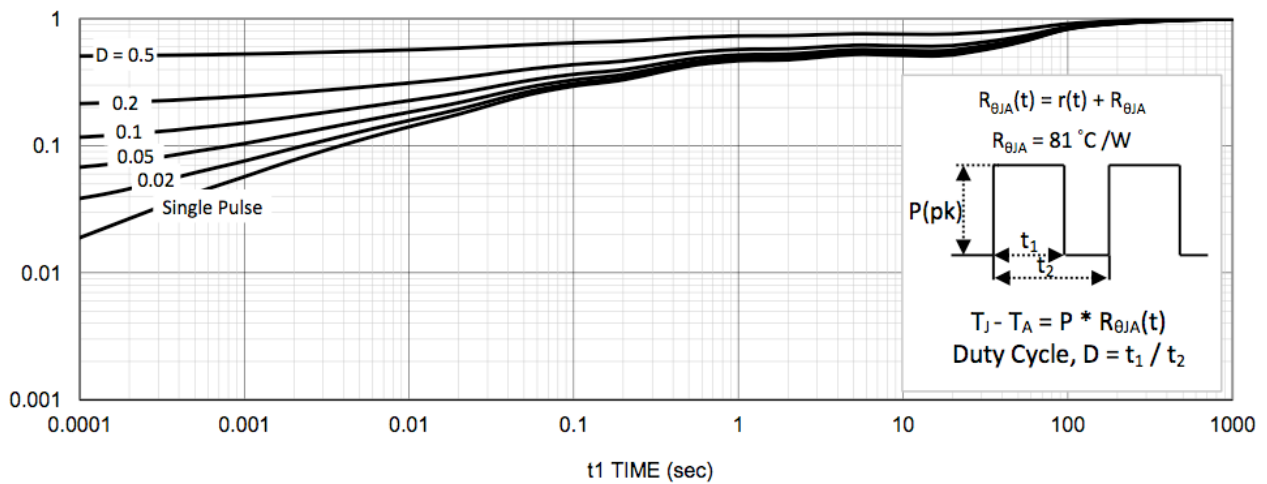
**8. Normalized On-Resistance Vs Junction Temperature**



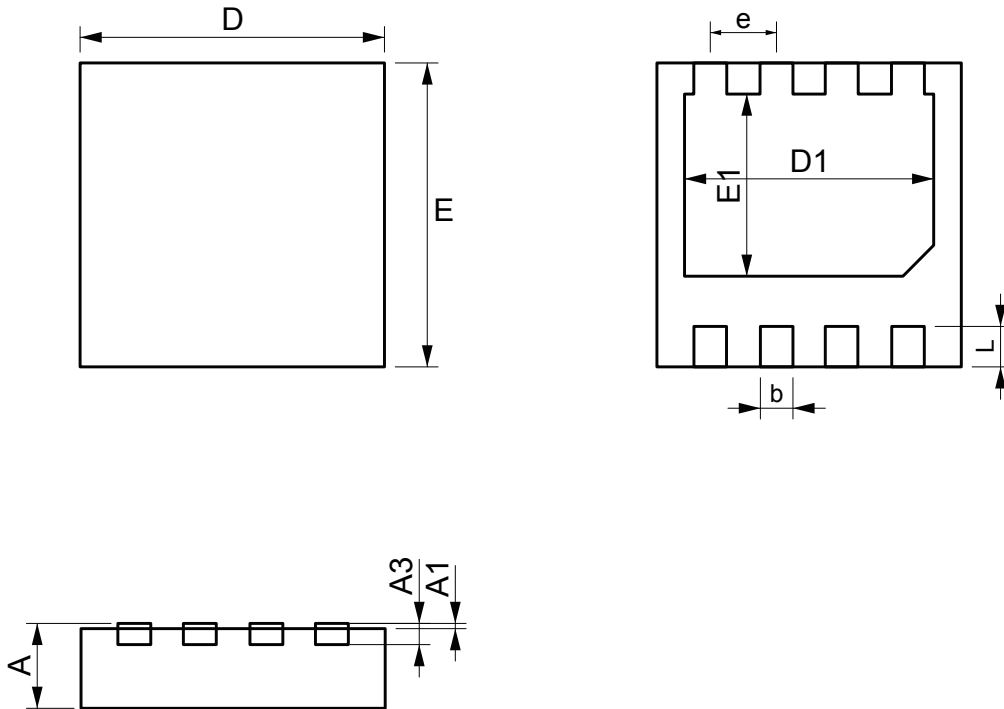
**9. Safe Operating Area**



**10. Single Pulse Maximum Power Dissipation**



**11. Normalized Thermal Transient Junction to Ambient**

**Packaging information**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A3	0.203REF		0.008REF	
D	2.924	3.076	0.115	0.121
E	2.924	3.076	0.115	0.121
D1	2.350	2.550	0.093	0.100
E1	1.700	1.900	0.067	0.075
k	0.200MIN.		0.008MIN.	
b	0.270	0.370	0.011	0.015
e	0.650TYP.		0.026TYP.	
L	0.324	0.476	0.013	0.019

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