

General Description

The WSD1216DN22 is the highest performance trench P-ch MOSFETs with extreme high cell density, which provide excellent R_{DS(on)} and gate charge for most of the small power switching and load switch applications.

The WSD1216DN22 meet the RoHS and Green Product requirement with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent C_{dv/dt} effect decline
- Green Device Available

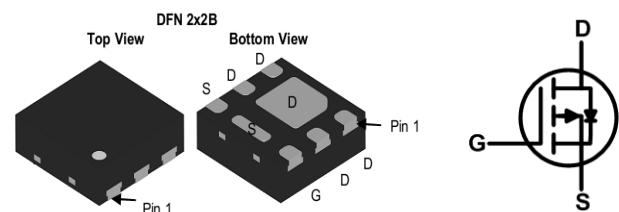
Product Summary

BVDSS	R _{DS(on)}	I _D
-12V	15mΩ	-9.4A

Applications

- High Frequency Point-of-Load Synchronous Small power switching for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

DFN2X2-6L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	-12	V
V _{GS}	Gate-Source Voltage	±8	V
I _D @T _c =25°C	Continuous Drain Current, V _{GS} @ -4.5V ¹	-9.4	A
I _D @T _c =70°C	Continuous Drain Current, V _{GS} @ -4.5V ¹	-7.5	A
I _{DM}	300μS Pulsed Drain Current, V _{GS} =-4.5V ²	-37.5	A
P _D @T _A =25°C	Total Power Dissipation ³	2.5	W
T _{STG}	Storage Temperature Range	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction-ambient ¹	---	80	°C/W
R _{θJC}	Thermal Resistance Junction-Case ¹	---	28	°C/W

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-12	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BVDSS Temperature Coefficient	Reference to 25°C , $I_D=-1\text{mA}$	---	-0.01	---	V/ $^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-4.5V, I_D=-9.4A$	---	15	20	m Ω
		$V_{GS}=-2.5V, I_D=-5.9A$	---	20	27	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.4	---	-0.9	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	3.13	---	mV/ $^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-8V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	μA
		$V_{DS}=-8V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	-5	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 8V, V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=-5V, I_D=-1A$	---	16	---	S
R_g	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	2	---	Ω
Q_g	Total Gate Charge (-4.5V)	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-9.4A$	---	15.5	---	nC
Q_{gs}	Gate-Source Charge		---	2.3	---	
Q_{gd}	Gate-Drain Charge		---	4.6	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-10V, V_{GS}=-4.5V, R_G=6\Omega$ $I_D=-1A, R_L=10\Omega$	---	7	---	ns
T_r	Rise Time		---	12	---	
$T_{d(off)}$	Turn-Off Delay Time		---	21	---	
T_f	Fall Time		---	12	---	
C_{iss}	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, f=1\text{MHz}$	---	1400	---	μF
C_{oss}	Output Capacitance		---	297	---	
C_{riss}	Reverse Transfer Capacitance		---	237	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	-2.0	A
I_{SM}	Pulsed Source Current ^{2,4}		---	---	-37.7	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1	V
t_{rr}	Reverse Recovery Time	$I_F=-9.4A, di/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	26	---	nS
Q_{rr}	Reverse Recovery Charge		---	10	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper, $t \leq 10\text{sec}$.
- 2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The power dissipation is limited by 150°C junction temperature
- 4.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

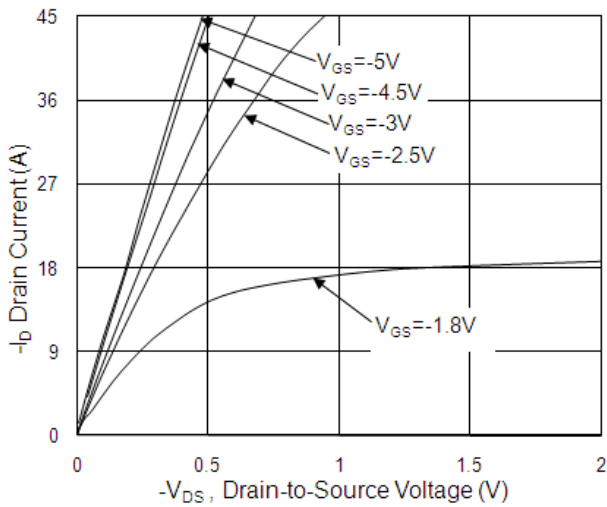


Fig.1 Typical Output Characteristics

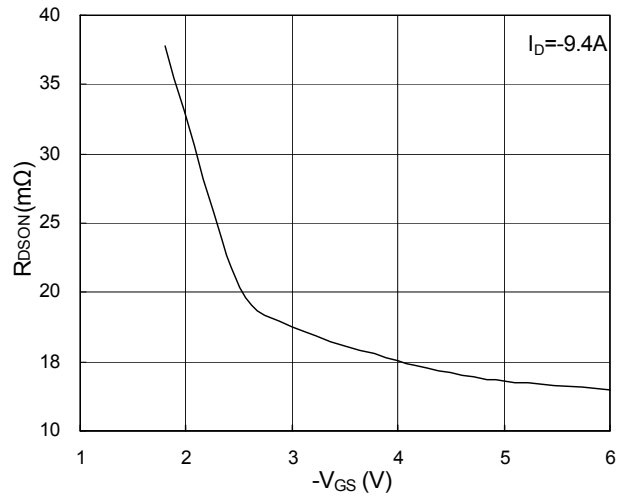


Fig.2 On-Resistance vs. Gate-Source

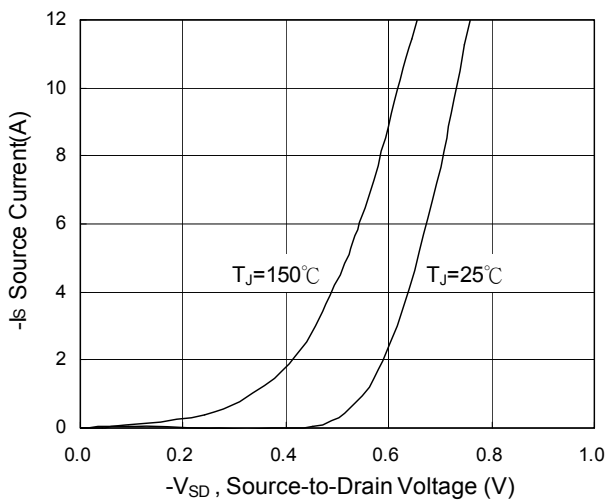


Fig.3 Forward Characteristics Of Reverse

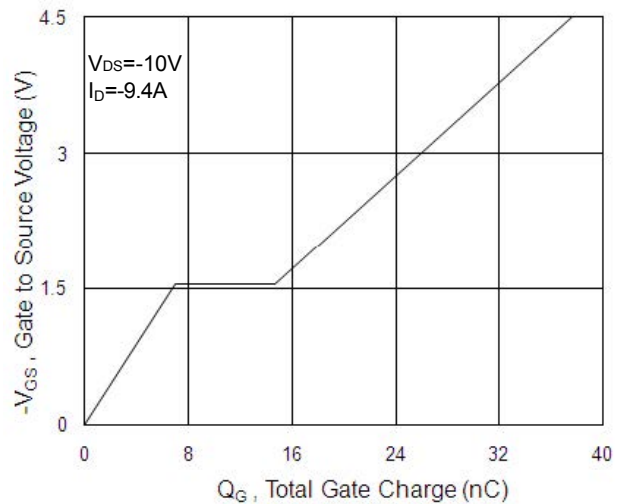


Fig.4 Gate-Charge Characteristics

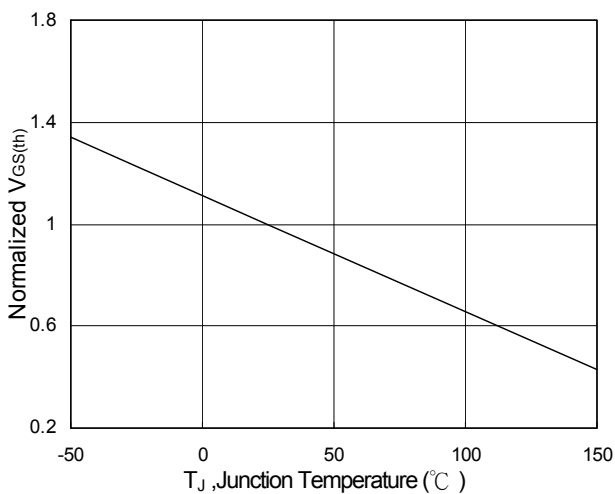


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

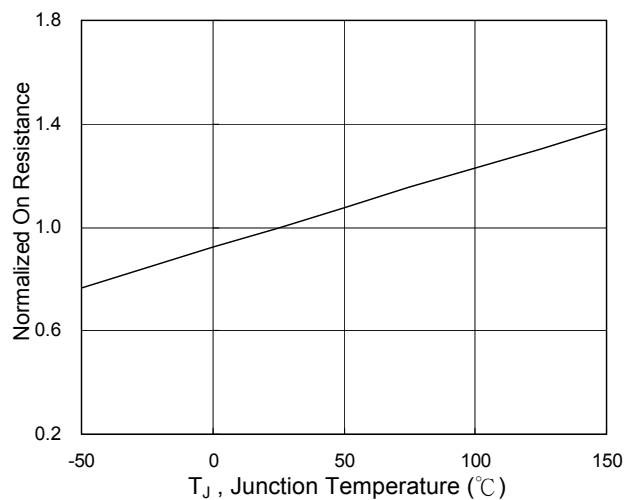


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

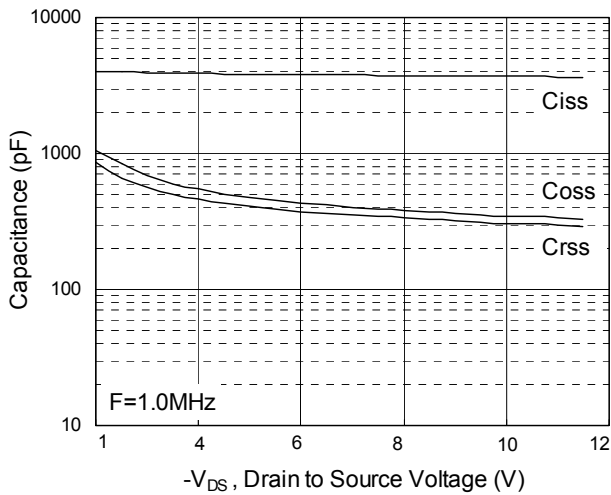


Fig.7 Capacitance

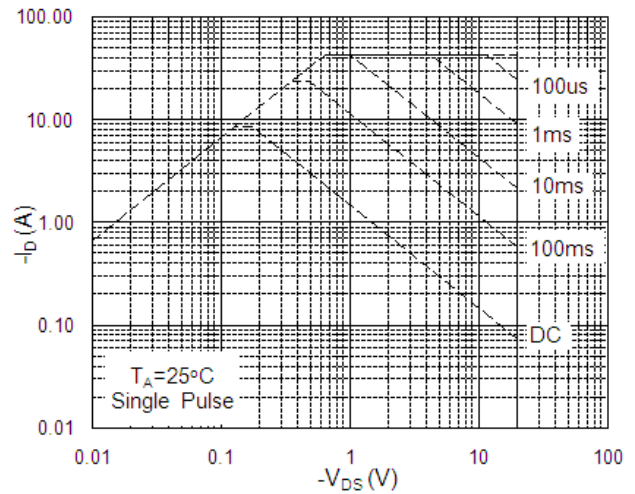


Fig.8 Safe Operating Area

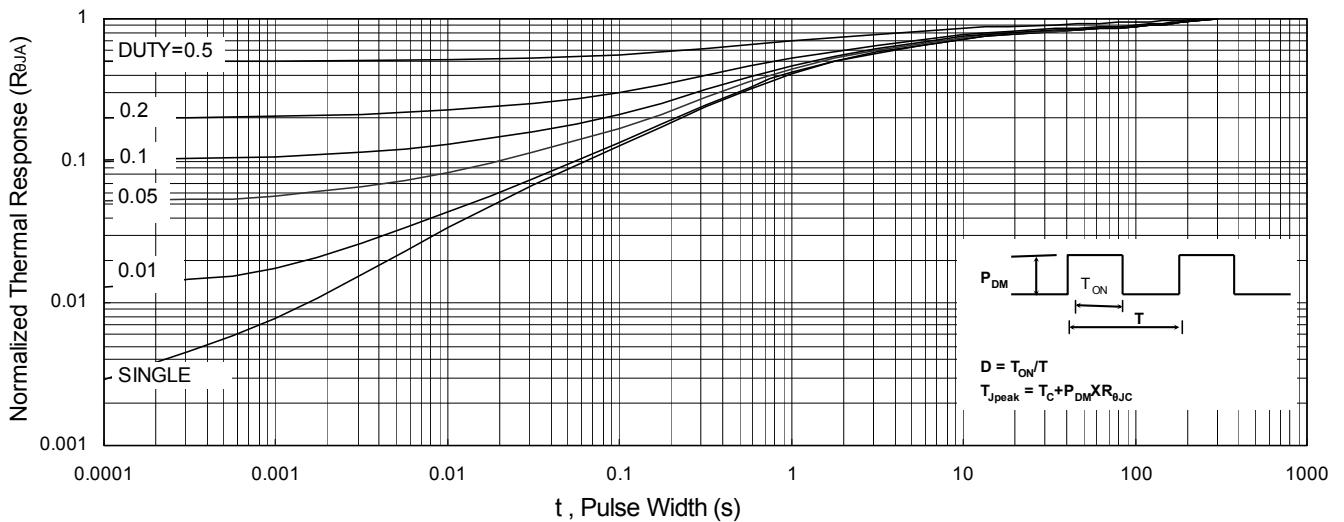


Fig.9 Normalized Maximum Transient Thermal Impedance

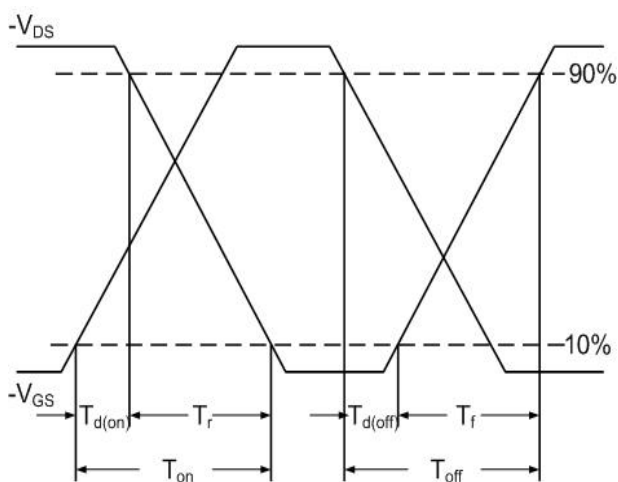


Fig.10 Switching Time Waveform

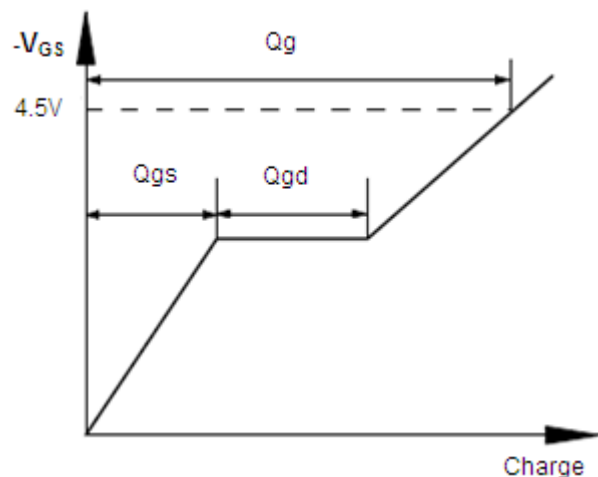


Fig.11 Gate Charge Waveform

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