

## General Description

The WSD6068DN56 is the highest performance trench Dual N-Ch MOSFET with extreme high cell density, which provide excellent R<sub>DS(on)</sub> and gate charge for most of the synchronous buck converter applications.

The WSD6068DN56 meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

## Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

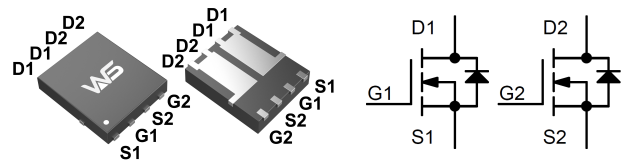
## Product Summary

BVDSS	R <sub>DS(on)</sub>	I <sub>D</sub>
60V	12mΩ	25A

## Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Fast switching
- Load Switch

## DFN5X6C-8-EP2 Pin Configuration



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
<b>Common Ratings</b>				
V <sub>DSS</sub>	Drain-Source Voltage	60	V	
V <sub>GSS</sub>	Gate-Source Voltage	±20	V	
T <sub>J</sub>	Maximum Junction Temperature	150	°C	
T <sub>STG</sub>	Storage Temperature Range	-55 to 175	°C	
I <sub>S</sub>	Diode Continuous Forward Current	T <sub>c</sub> =25°C	25	A
I <sub>D</sub>	Continuous Drain Current	T <sub>c</sub> =25°C	25	A
		T <sub>c</sub> =70°C	18.5	
I <sub>DM</sub> <sup>b</sup>	Pulse Drain Current Tested	T <sub>c</sub> =25°C	95	A
P <sub>D</sub>	Maximum Power Dissipation	T <sub>c</sub> =25°C	37	W
		T <sub>c</sub> =70°C	25	
R <sub>θJL</sub>	Thermal Resistance-Junction to Lead	Steady State	5	°C/W
R <sub>θJA</sub>	Thermal Resistance-Junction to Ambient	t ≤ 10s	25	°C/W
		Steady State <sup>b</sup>	90	
I <sub>AS</sub> <sup>d</sup>	Avalanche Current, Single pulse	L=0.5mH	9	A
E <sub>AS</sub> <sup>d</sup>	Avalanche Energy, Single pulse	L=0.5mH	20	mJ

Note a : Max. continuous current is limited by bonding wire.

Note b : Pulse width limited by max. junction temperature.

Note c : Surface mounted on 1in<sup>2</sup> pad area, steady state t = 999s.

Note d : UIS tested and pulse width limited by maximum junction temperature 175°C (initial temperature T<sub>J</sub>=25°C).

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

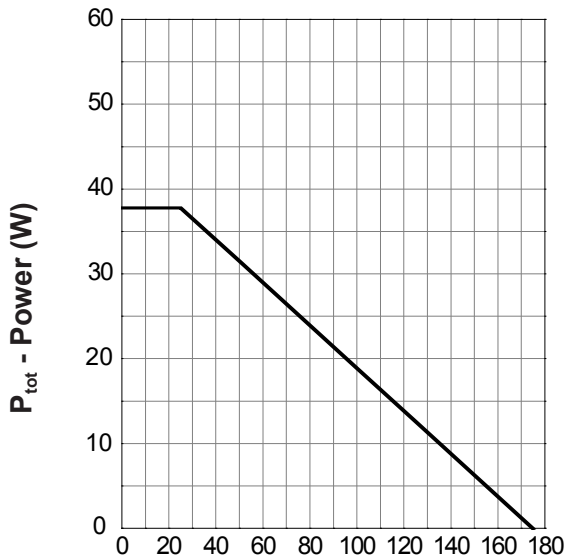
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA	60	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =48V, V <sub>GS</sub> =0V	-	-	1	μA
		T <sub>J</sub> =85°C	-	-	30	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	1.2	1.8	3.1	V
I <sub>GSS</sub>	Gate Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
R <sub>DS(ON)</sub> <sup>3</sup>	Drain-Source On-state Resistance	V <sub>GS</sub> =10V, I <sub>DS</sub> =10A	-	12	16	mΩ
		V <sub>GS</sub> =4.5V, I <sub>DS</sub> =7A	-	15	22	
<b>Diode Characteristics</b>						
V <sub>SD</sub>	Diode Forward Voltage	I <sub>SD</sub> =1A, V <sub>GS</sub> =0V	-	0.75	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> =20A, dI <sub>SD</sub> /dt=100A/μs	-	26	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	30	-	nC
<b>Dynamic Characteristics</b> <sup>3,4</sup>						
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	-	0.9	-	Ω
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =30V, F=1.0MHz Ω	-	440	570	pF
C <sub>oss</sub>	Output Capacitance		-	198	-	
C <sub>riss</sub>	Reverse Transfer Capacitance		-	57	-	
t <sub>d(ON)</sub>	Turn-on Delay Time	V <sub>DD</sub> =30V, I <sub>DS</sub> =1A, V <sub>GEN</sub> =10V, R <sub>G</sub> =3.3Ω.	-	10	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	14.5	-	
t <sub>d(OFF)</sub>	Turn-off Delay Time		-	19	-	
t <sub>f</sub>	Turn-off Fall Time		-	28	-	
<b>Gate Charge Characteristics</b> <sup>3,4</sup>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>DS</sub> =20A	-	8.6	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	2.7	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	6.3	-	

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=30V, V<sub>GS</sub>=10V, L=0.5mH, I<sub>AS</sub>=9A., R<sub>G</sub>=25Ω Starting T<sub>J</sub>=25
3. The data tested by pulsed , pulse width<=300us , duty cycle<=2%.
4. Essentially independent of operating temperature.

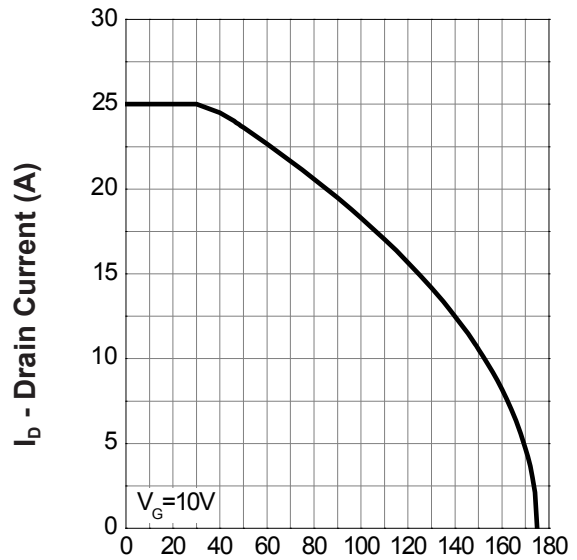
Typical Operating Characteristics

Power Dissipation



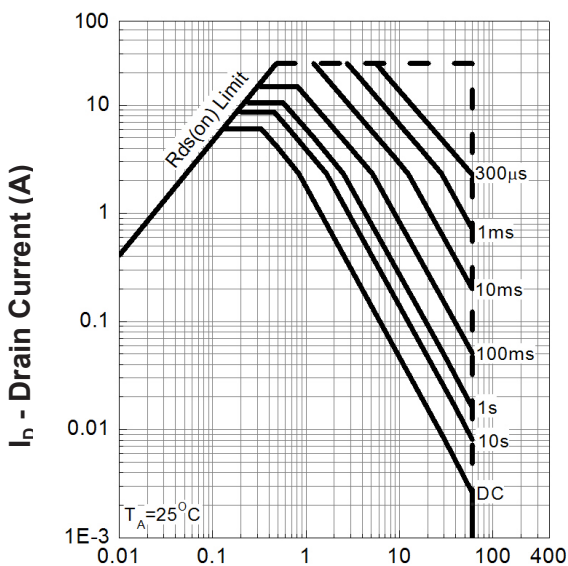
T<sub>c</sub> - Case Temperature (°C)

Drain Current



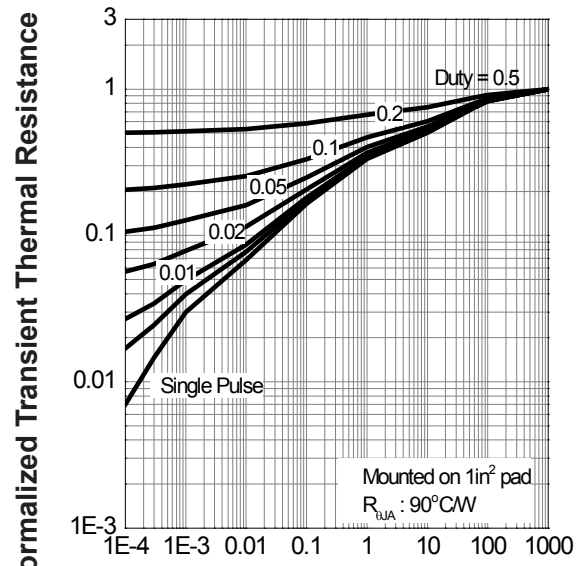
T<sub>c</sub> - Case Temperature (°C)

Safe Operation Area



V<sub>DS</sub> - Drain - Source Voltage (V)

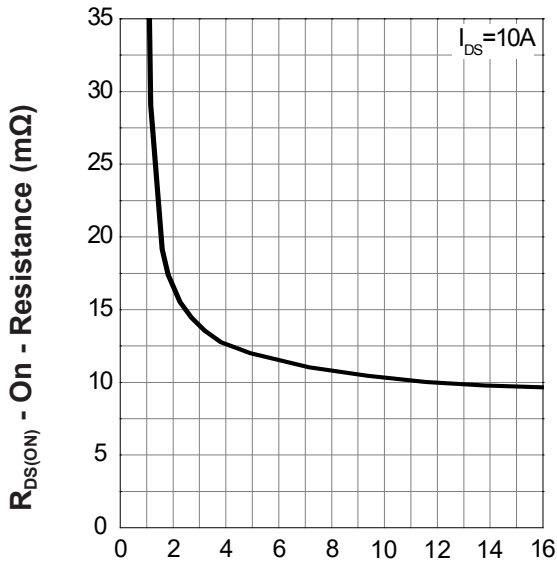
Thermal Transient Impedance



Square Wave Pulse Duration (sec)

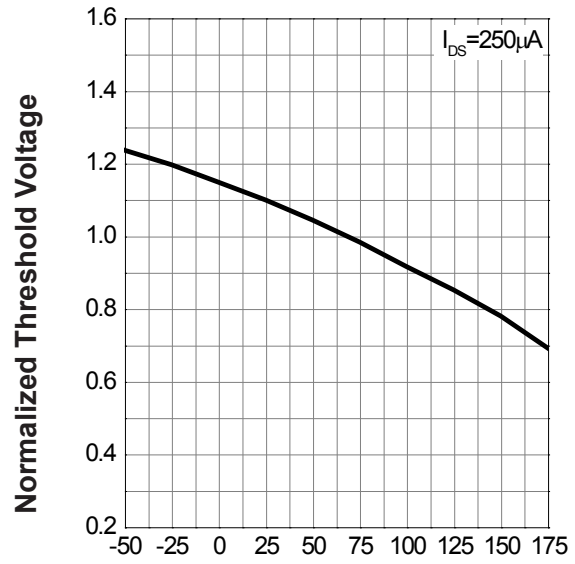
Typical Operating Characteristics(Cont.)

Gate-Source On Resistance



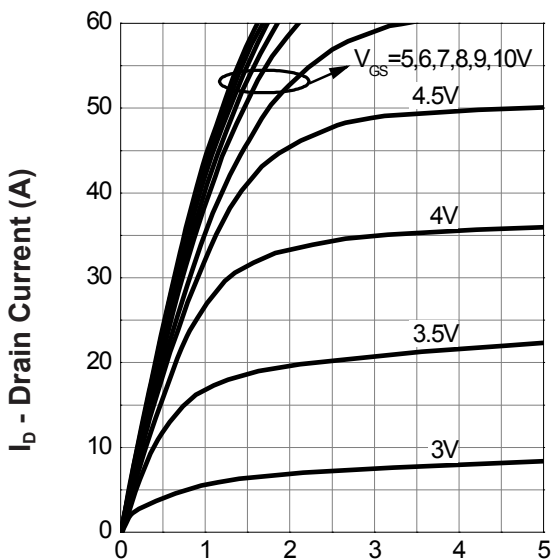
$V_{GS}$  - Gate - Source Voltage (V)

Gate Threshold Voltage



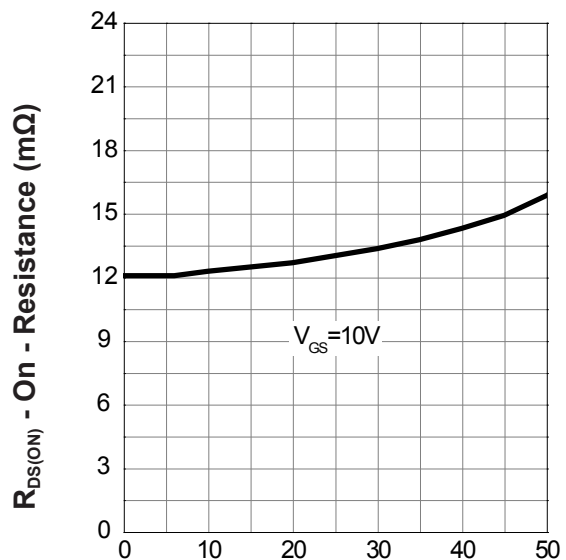
$T_j$  - Junction Temperature (°C)

Output Characteristics



$V_{DS}$  - Drain - Source Voltage (V)

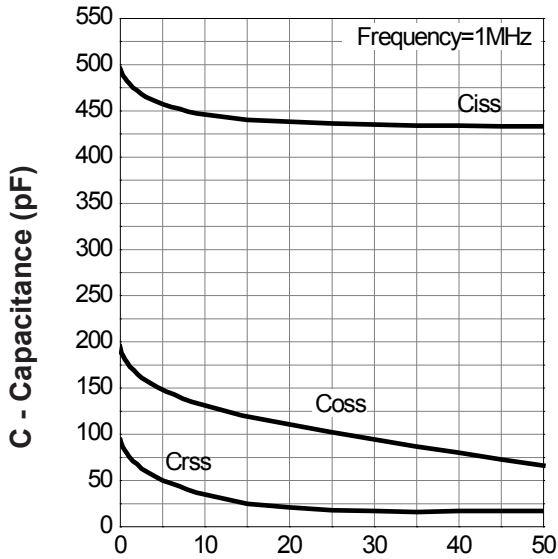
Drain-Source On Resistance



$I_D$  - Drain Current (A)

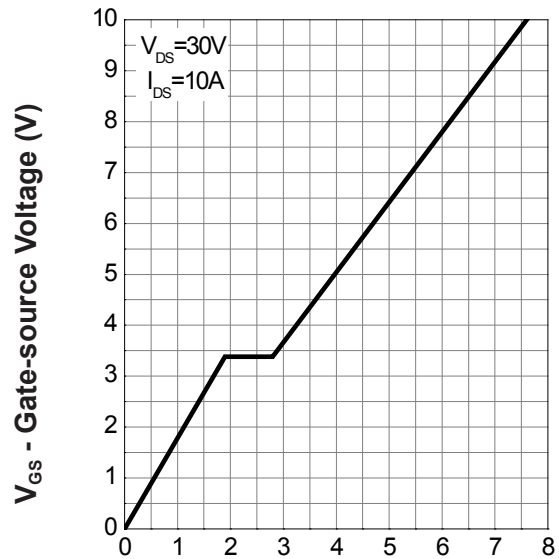
Typical Operating Characteristics(Cont.)

Capacitance



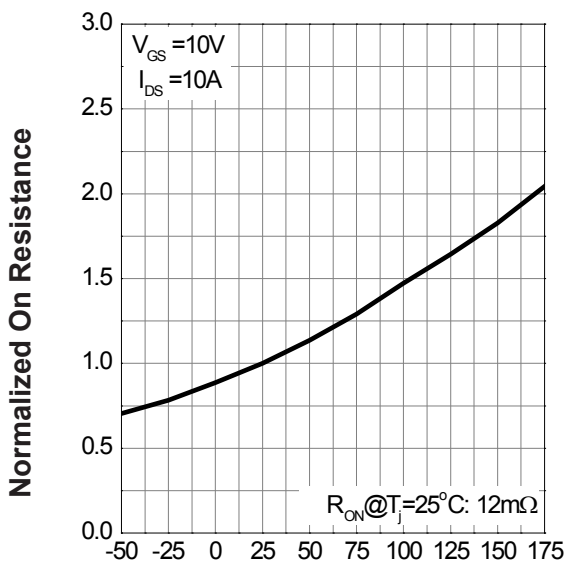
$V_{DS}$  - Drain-Source Voltage (V)

Gate Charge



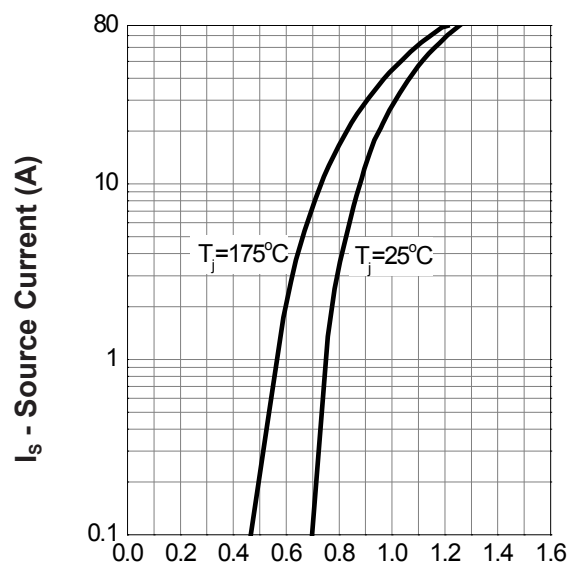
$Q_G$  - Gate Charge (nC)

Drain-Source On Resistance



$T_j$  - Junction Temperature (°C)

Source-Drain Diode Forward



$V_{SD}$  - Source - Drain Voltage (V)



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