

General Description

The WSD6060DN56 is the highest performance trench N-Ch MOSFET with extreme high cell density, which provide excellent RDS(on) and gate charge for most of the synchronous buck converter applications.

The WSD6060DN56 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

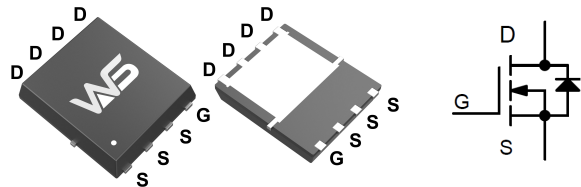
Product Summary

BVDSS	RDS(on)	ID
60V	7.5mΩ	65A

Applications

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

DFN5X6 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
Common Ratings				
V _{DSS}	Drain-Source Voltage	60	V	
V _{GSS}	Gate-Source Voltage	±20	V	
T _J	Maximum Junction Temperature	150	°C	
T _{STG}	Storage Temperature Range	-55 to 150	°C	
I _S	Diode Continuous Forward Current	T _c =25°C	30	A
I _D	Continuous Drain Current	T _c =25°C	65	A
		T _c =70°C	42	
I _{DM} ^b	Pulse Drain Current Tested	T _c =25°C	250	A
P _D	Maximum Power Dissipation	T _c =25°C	62.5	W
		T _c =70°C	38	
R _{θJL}	Thermal Resistance-Junction to Lead	Steady State	2.1	°C/W
R _{θJA}	Thermal Resistance-Junction to Ambient	t ≤ 10s	45	°C/W
		Steady State ^b	50	
I _{AS} ^d	Avalanche Current, Single pulse	L=0.5mH	18	A
E _{AS} ^d	Avalanche Energy, Single pulse	L=0.5mH	81	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 1in² pad area, steady state t = 999s.

Note d : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature T_J=25°C).

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

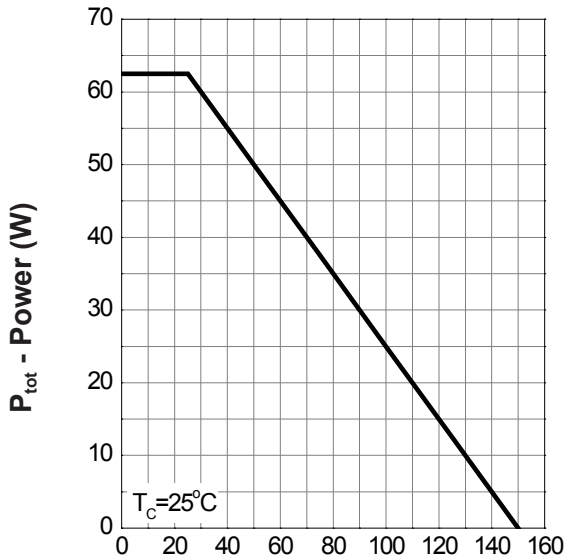
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =48V, V _{GS} =0V T _J =85°C	-	-	1	μA
			-	-	30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1.2	1.5	2.5	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ³	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =20A	-	7.5	10	mΩ
		V _{GS} =4.5V, I _{DS} =15A	-	10	15	
Diode Characteristics						
V _{SD}	Diode Forward Voltage	I _{SD} =1A, V _{GS} =0V	-	0.75	1.2	V
t _{rr}	Reverse Recovery Time	I _{SD} =20A, dI _{SD} /dt=100A/μs	-	42	-	ns
Q _{rr}	Reverse Recovery Charge		-	36	-	nC
Dynamic Characteristics ^{3,4}						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	1.5	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, F=1.0MHz	-	1340	-	pF
C _{oss}	Output Capacitance		-	270	-	
C _{rss}	Reverse Transfer Capacitance		-	40	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =30V, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω.	-	15	-	ns
t _r	Turn-on Rise Time		-	6	-	
t _{d(OFF)}	Turn-off Delay Time		-	33	-	
t _f	Turn-off Fall Time		-	30	-	
Gate Charge Characteristics ^{3,4}						
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =4.5V, I _{DS} =20A	-	13	-	nC
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =10V, I _{DS} =20A	-	27	-	
Q _{gth}	Threshold Gate Charge		-	4.1	-	
Q _{gs}	Gate-Source Charge		-	5	-	
Q _{gd}	Gate-Drain Charge		-	4.2	-	

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=48V, V_{GS}=10V, L=0.1mH, I_{AS}=20A., R_G=25Ω Starting T_J=25
3. The data tested by pulsed , pulse width<=300us , duty cycle<=2%.
4. Essentially independent of operating temperature.

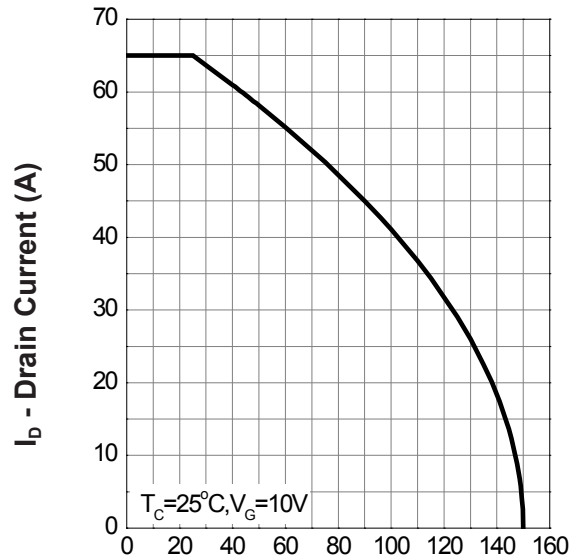
Typical Operating Characteristics

Power Dissipation



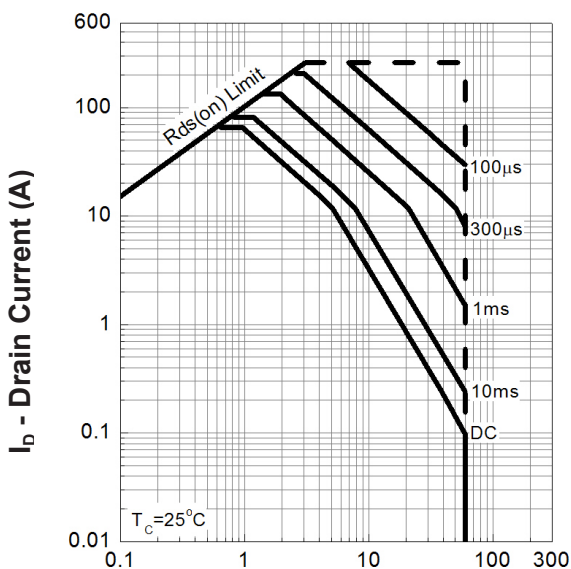
T_j - Junction Temperature ($^\circ\text{C}$)

Drain Current



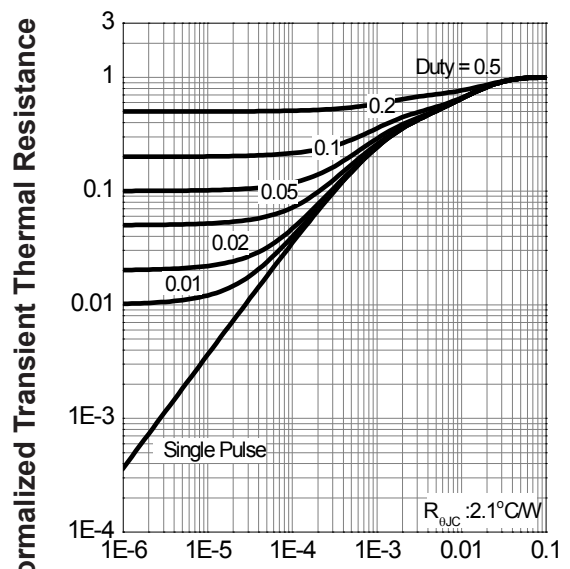
T_j - Junction Temperature ($^\circ\text{C}$)

Safe Operation Area



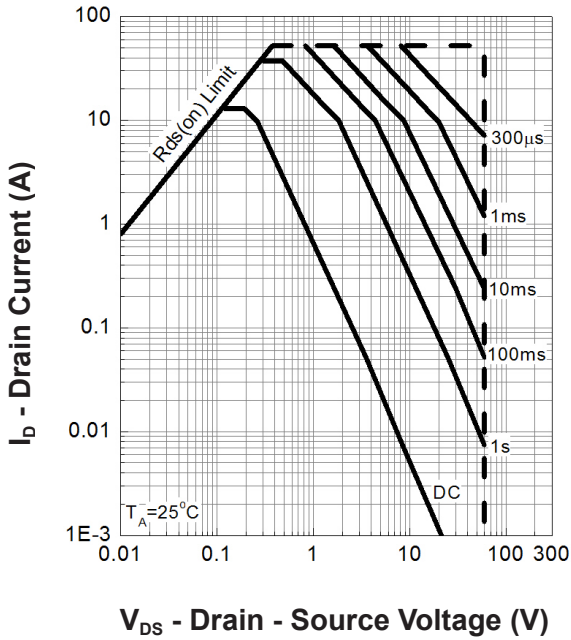
V_{DS} - Drain - Source Voltage (V)

Thermal Transient Impedance

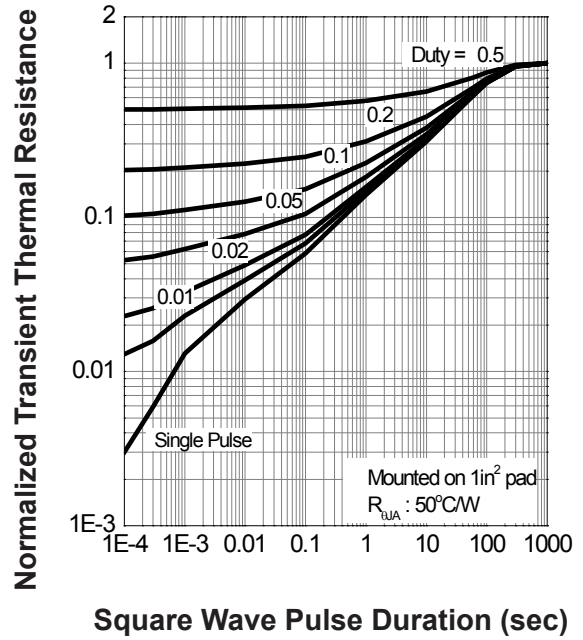


Square Wave Pulse Duration (sec)

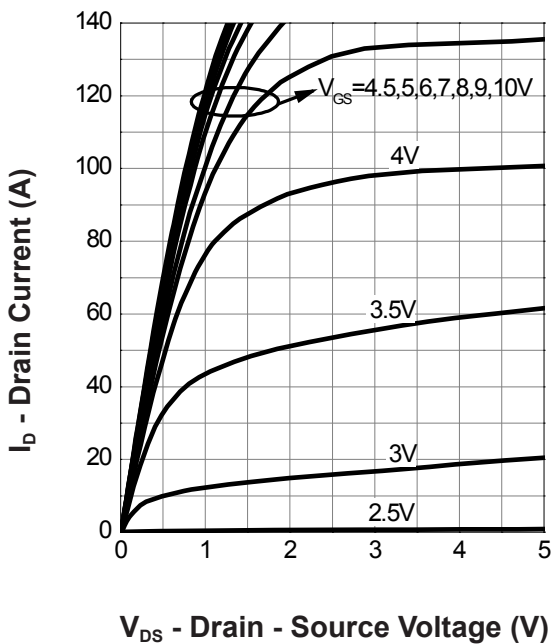
Safe Operation Area



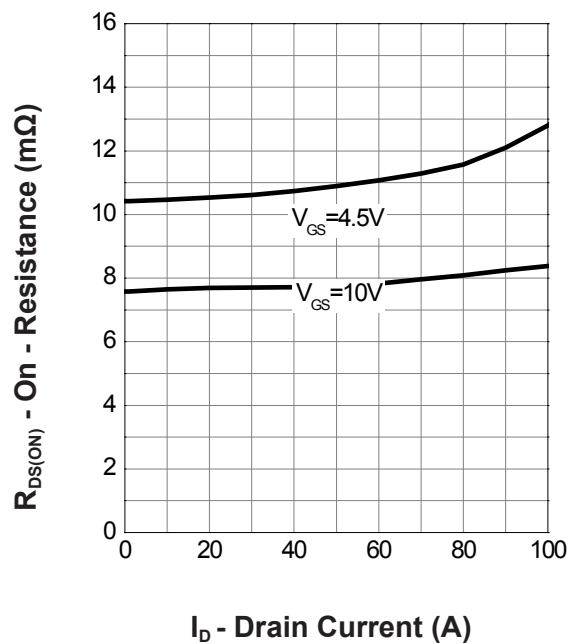
Thermal Transient Impedance



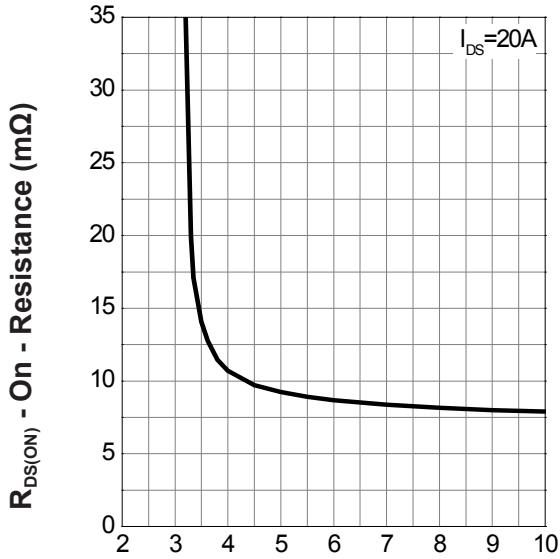
Output Characteristics



Drain-Source On Resistance

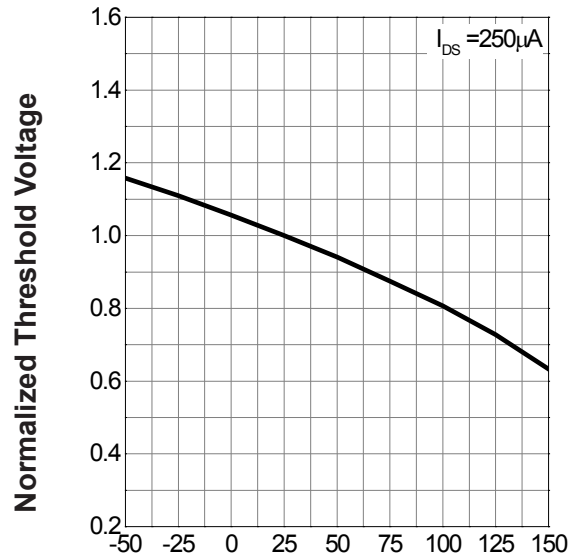


Gate-Source On Resistance



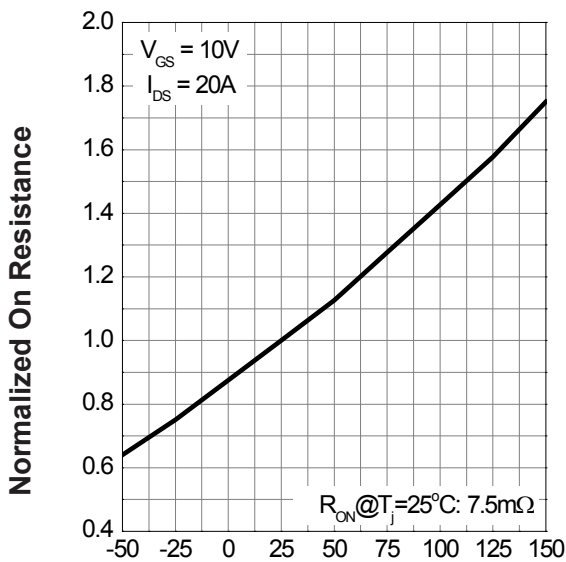
V_{GS} - Gate - Source Voltage (V)

Gate Threshold Voltage



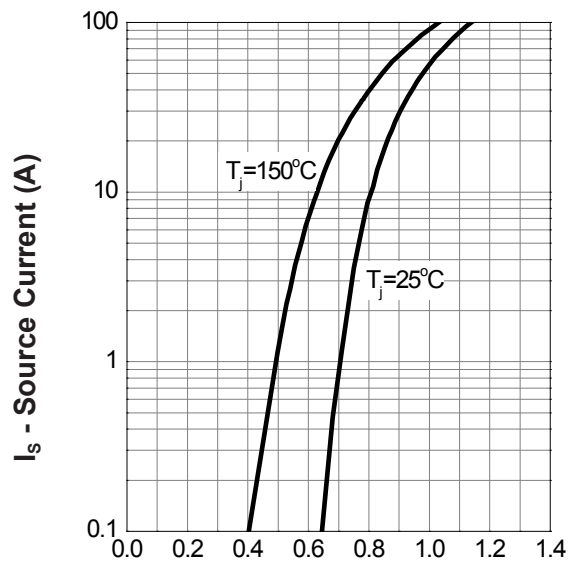
T_J - Junction Temperature (°C)

Drain-Source On Resistance



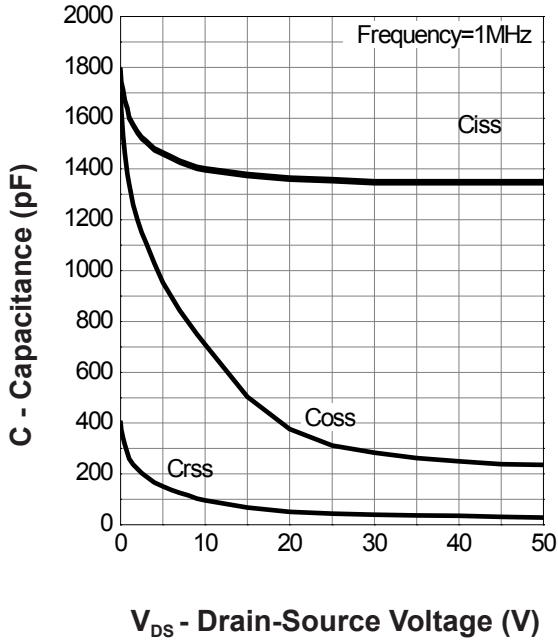
T_J - Junction Temperature (°C)

Source-Drain Diode Forward

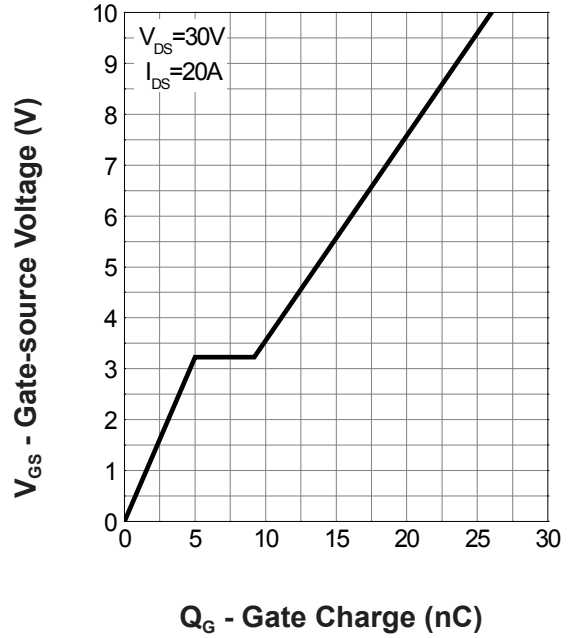


V_{SD} - Source - Drain Voltage (V)

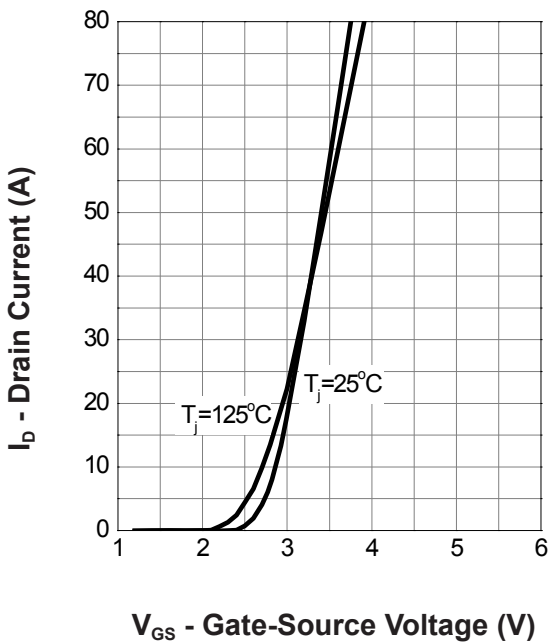
Capacitance



Gate Charge



Transfer Characteristics





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