General Description

The WSD6056DN56 is the highest performance trench Dual 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 WSD6056DN56 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

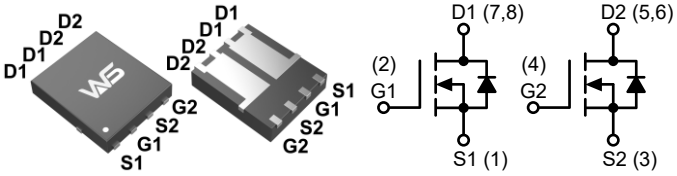
Product Summery

BV_{DSS}	$R_{DS(ON)}$	I_D
60V	16mΩ	45A

Applications

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

DFN5X6-8L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter		Rating	Units
V_{DS}	Drain-Source Voltage		60	V
V_{GS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	
I_S	Diode Continuous Forward Current	T_C=25°C	45	A
I_D	Continuous Drain Current	T_C=25°C	45	A
		T_C=70°C	28.5	
I_{DM} [b]	Pulse Drain Current Tested	T_C=25°C	180	A
P_D	Maximum Power Dissipation	T_C=25°C	67	W
		T_C=70°C	45	
$R_{\theta JL}$	Thermal Resistance-Junction to Lead	Steady State	5	°C/W
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	t ≤ 10s	45	°C/W
		Steady State [b]	90	
I_{AS} [d]	Avalanche Current, Single pulse	L=0.5mH	20	A
E_{AS} [d]	Avalanche Energy, Single pulse	L=0.5mH	20	mJ

Electrical Characteristics (T_J=25°C, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250μA	60	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=60V , V_{GS}=0V	---	---	1.0	μA
		T_J=85°C	---	---	30	
I_{GSS}	Gate Leakage Current	V_{GS}=±25V , V_{DS}=0V	---	---	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_{DS}=250μA	1.2	1.5	2.5	V
$R_{DS(ON)}$ [3]	Drain-Source On-state Resistance	V_{GS}=10V , I_D=20A	---	16	20	mΩ
		V_{GS}=4.5V , I_D=15A	---	20	25	
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	---	26	---	ns
Q_{rr}	Reverse Recovery Charge		---	30	---	nC
Dynamic Characteristics [3,4]						
R_g	Gat resistance	V_{GS}=0V , V_{DS}=0V , f=1.0MHz	---	0.9	---	Ω
C_{iss}	Input Capacitance	V_{GS}=0V , V_{DS}=30V , f=1.0MHz	---	945	---	pF
C_{oss}	Output Capacitance		---	275	---	
C_{rss}	Reverse Transfer Capacitance		---	26	---	
$T_{d(on)}$	Turn-on Delay Time	V_{DD}=30V , I_{DS}=1A V_{GEN}=10V , R_G=3.3Ω	---	10	---	ns
T_r	Turn-on Rise Time		---	13.5	---	
$T_{d(off)}$	Turn-off Delay Time		---	28	---	
T_f	Turn-on Fall Time		---	20	---	
Gate Charge Characteristics [3,4]						
Q_g	Total Gate Charge	V_{DS}=30V , V_{GS}=10V , I_{DS}=20A	---	28	---	nC
Q_g	Total Gate Charge	V_{DS}=30V , V_{GS}=10V , I_{DS}=20A	---	17.6	---	
Q_{gth}	Threshold Gate Charge		---	3.5	---	
Q_{gs}	Gate-Source Charge		---	2.7	---	
Q_{gd}	Gate-Drain Charge		---	6.3	---	

Note:

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

b: Pulse width limited by max. junction temperature.

c: Surface mounted on 1in^2 pad area, steady state t = 999s.

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

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. VDD=48V,VGS=10V,L=0.1mH,IAS=20A.,RG=25Ω Starting TJ=25°C
3. The data tested by pulsed, pulse width ≤ 300μs , duty cycle ≤ 2%.
4. Essentially independent of operating temperature.

Typical Characteristics

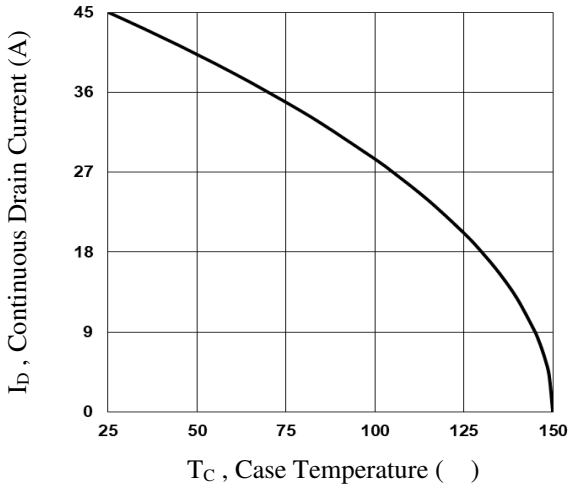


Fig.1 Continuous Drain Current vs. T_C

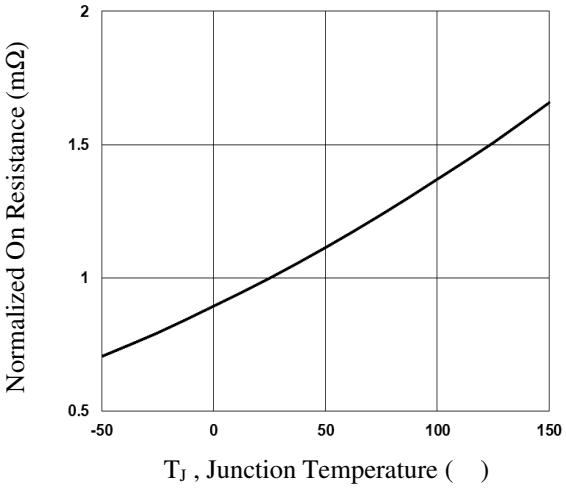


Fig.2 Normalized RDSON vs. T_J

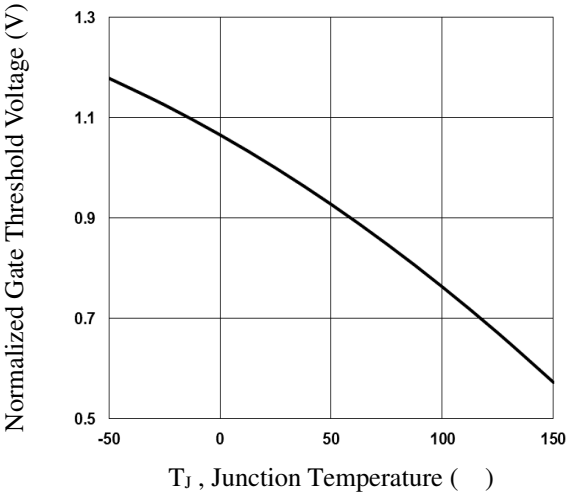


Fig.3 Normalized V_{th} vs. T_J

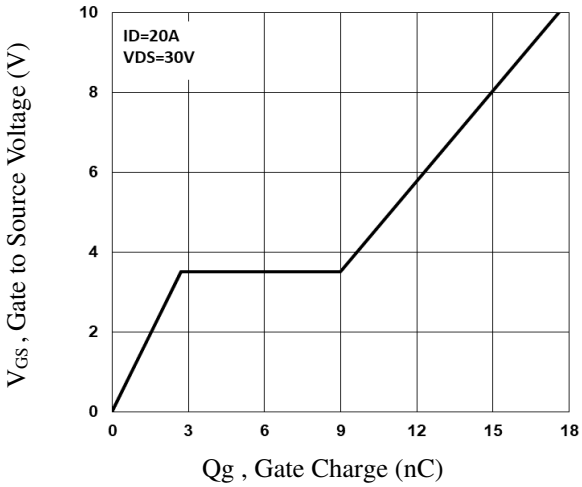


Fig.4 Gate Charge Waveform

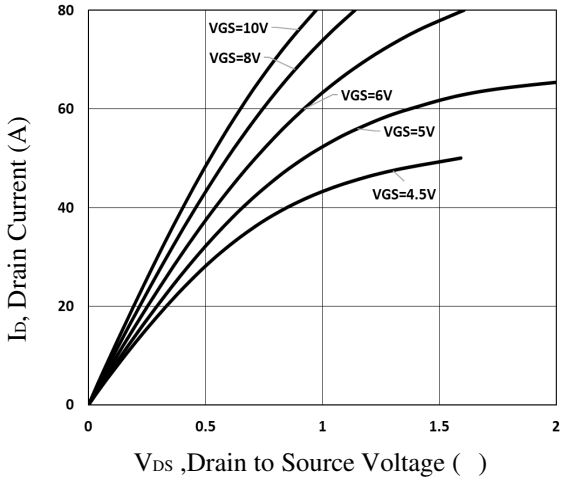


Fig.5 Typical Output Characteristics

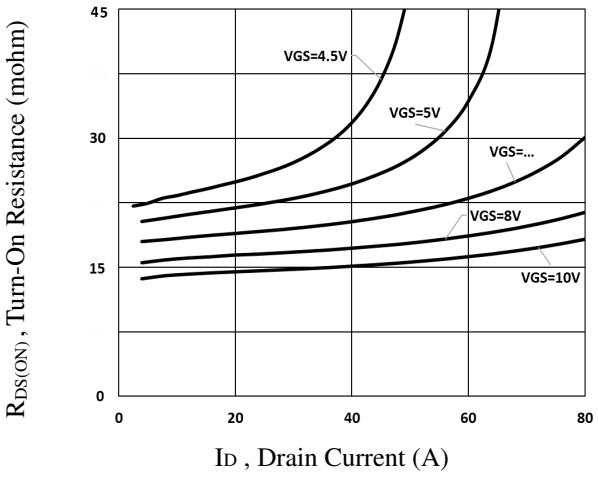


Fig.6 Turn-On Resistance vs. I_D

Typical Characteristics (Cont.)

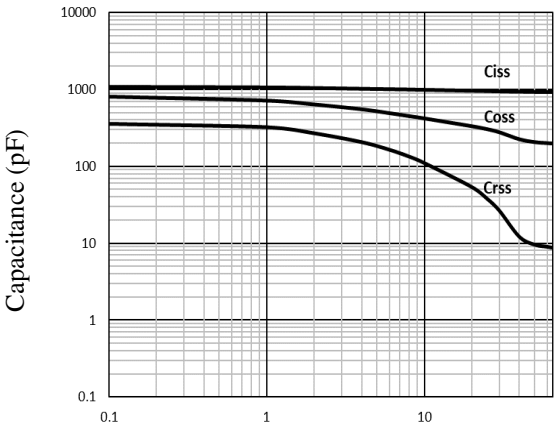


Fig.7 Capacitance Characteristics

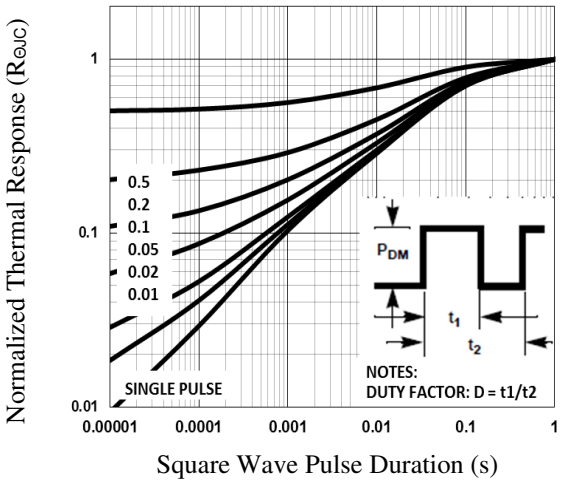


Fig.8 Normalized Transient Response

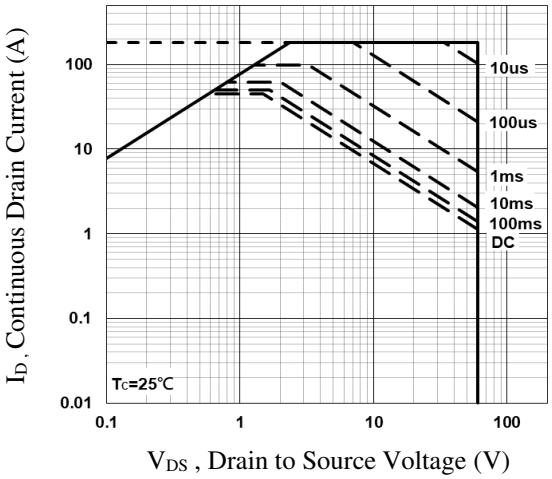


Fig.9 Maximum Safe Operation Area

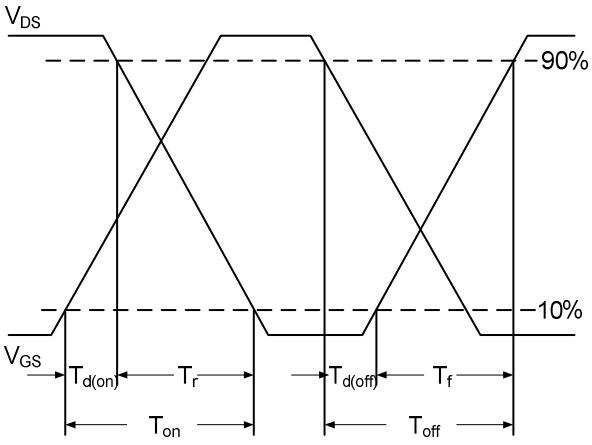


Fig.10 Switching Time Waveform

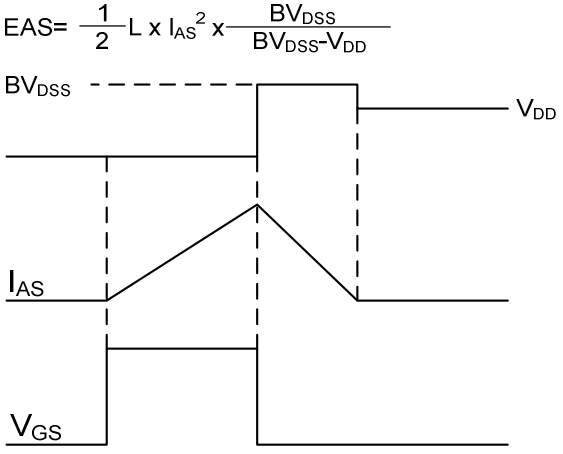
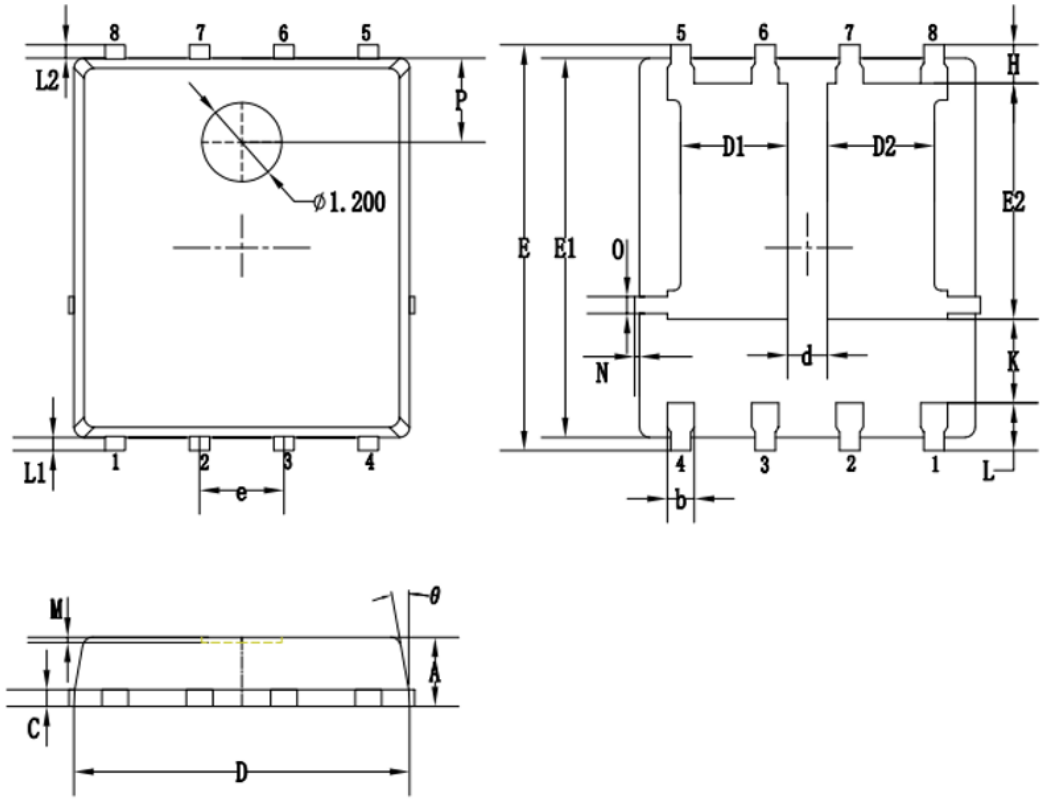


Fig.11 EAS Waveform

Packaging information



SYMBOLS	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.05	1.20
b	0.35	0.40	0.50
C	0.20	0.25	0.35
D	4.90	5.05	5.20
D1/D2	1.51	1.61	1.71
d	0.50	0.60	0.70
E	6.00	6.15	6.30
E1	5.60	5.75	5.90
E2	3.47	3.57	3.67
e	1.27 BSC.		
H	0.48	0.58	0.68
K	1.17	1.27	1.37
L	0.64	0.74	0.84
L1/L2	0.20 REF.		
θ	8°	10°	12°
M	0.08 REF.		
N	0	-	0.15
O	0.25 REF.		
P	1.28 REF.		

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