WSD2090DN56

N-Channel MOSFET

General Description

The WSD2090DN56 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 WSD2090DN56 meet the RoHS and Green Product requirement 100% E_{AS} guaranteed with full function reliability approved.

Product Summery

BV_{DSS}	$R_{DS(ON)}$	I_D
20V	2.8mΩ	80A

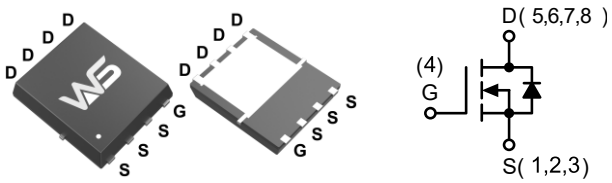
Applications

- Switch
- Power System
- Load Switch

Features

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

DFN5X6-8L Pin Configuration



Absolute Maximum Ratings (T_C=25°C, Unless Otherwise Noted)

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-Source Voltage	20	V
V_{GSS}	Gate-Source Voltage	±12	
I_D@T_C=25°C	Continuous Drain Current, V_{GS} @ 10V [1]	80	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V [1]	59	
I_{DM}	Pulsed Drain Current [1]	360	
E_{AS}	Single Pulse Avalanche Energy [2]	110	mJ
P_D	Power Dissipation	81	W
T_{STG}	Storage Temperature Range	-55 to 175	°C
T_J	Operating Junction Temperature Range	-55 to 175	

Thermal Data

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient [1]	---	65	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case [1]	---	4	

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250μA	20	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C, I_D=1mA	---	-0.018	---	V/°C
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250μA	0.5	0.8	1.3	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V , I_D=30A	---	2.8	4.0	mΩ
		V_{GS}=2.5V , I_D=20A	---	4.0	6.0	
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V , V_{GS}=0V	---	---	1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±10V , V_{DS}=0V	---	---	±100	nA
Q_g	Total Gate Charge	V_{GS}=4.5V , V_{DS}=10V , I_D=30A	---	11.5	---	nC
Q_{gs}	Gate-Source Charge		---	1.73	---	
Q_{gd}	Gate-Drain Charge		---	3.1	---	
$T_{d(on)}$	Turn-On Delay Time	V_{GS}=4.5V , V_{DS}=10V , I_D=30A , R_{GEN}=1.8Ω	---	9.7	---	ns
T_r	Turn-On Rise Time		---	37	---	
$T_{d(off)}$	Turn-Off Delay Time		---	63	---	
T_f	Turn-Off Fall Time		---	52	---	
C_{iss}	Input Capacitance	V_{DS}=10V , V_{GS}=0V , f = 1.0MHz	---	4260	---	pF
C_{oss}	Output Capacitance		---	510	---	
C_{rss}	Reverse Transfer Capacitance		---	480	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{SD}	Diode Forward Voltage	I_S=7.6A , V_{GS}=0V	---	---	1.2	V

Note:

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed , pulse width ≤ 300μs , duty cycle ≤ 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.
5. E_{AS} condition: T_J=25°C, V_{DD}=15V, V_G=4.5V, R_G=25Ω, L=0.5mH, I_{AS}=21A

Typical Characteristics

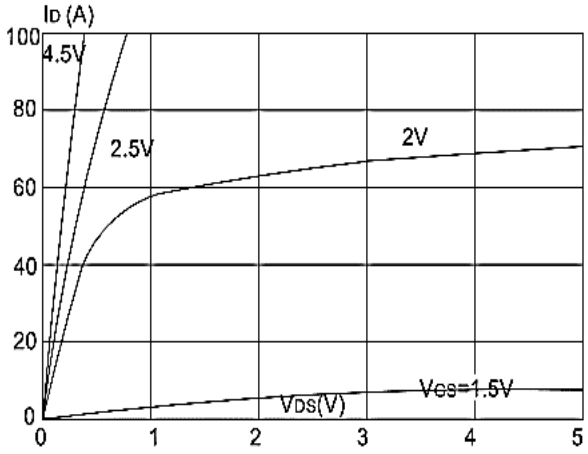


Figure1: Output Characteristics

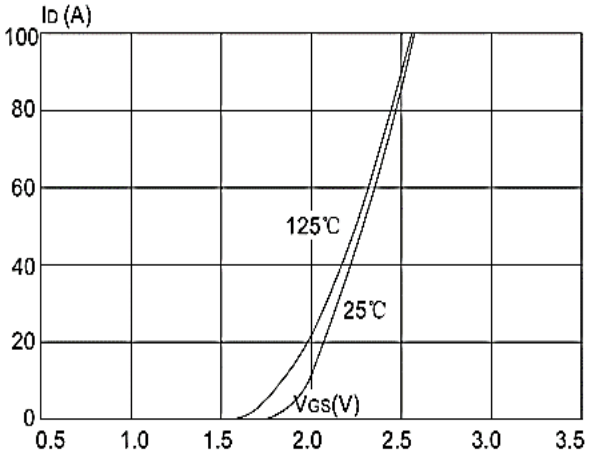


Figure 2: Typical Transfer Characteristics

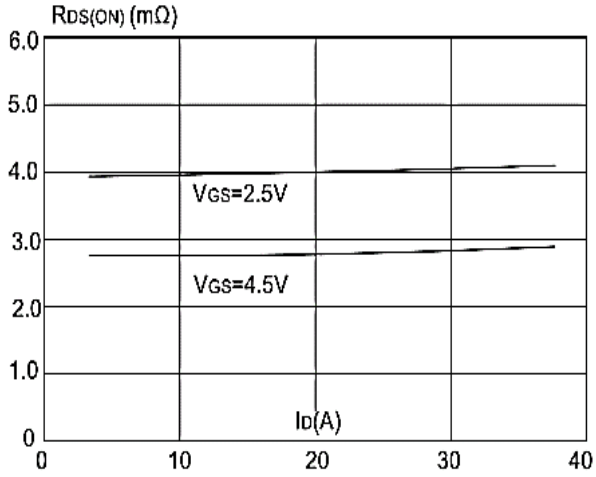


Figure 3:On-resistance vs. Drain Current

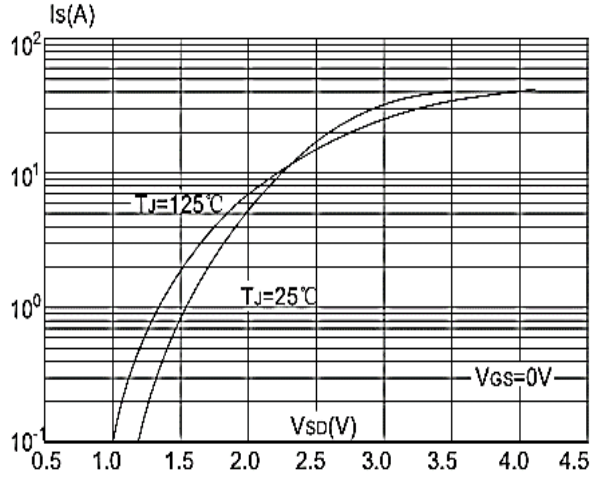


Figure 4: Body Diode Characteristics

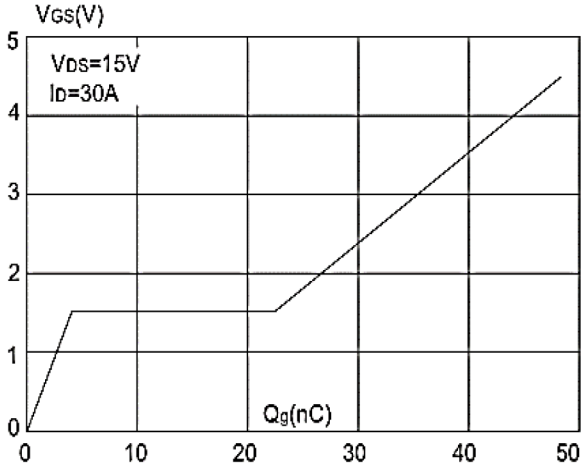


Figure 5: Gate Charge Characteristics

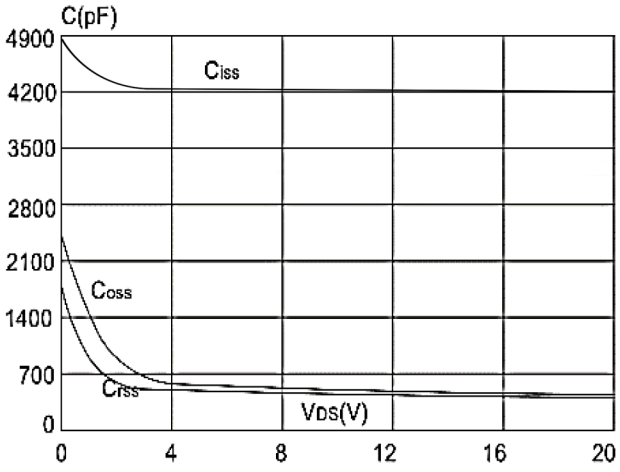


Figure 6: Capacitance Characteristics

Typical Characteristics (Cont.)

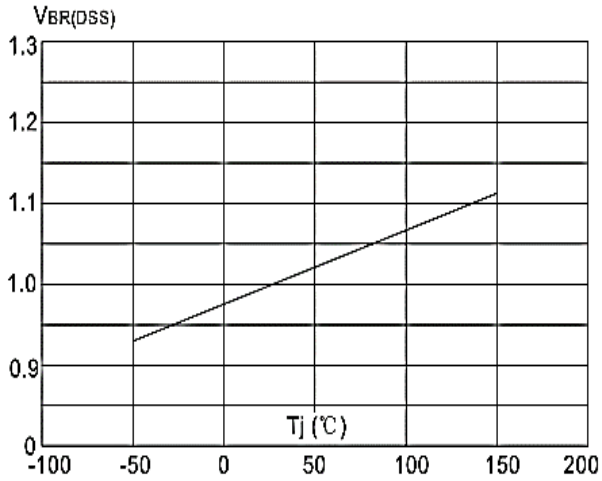


Figure 7: Normalized Breakdown Voltage vs Junction Temperature

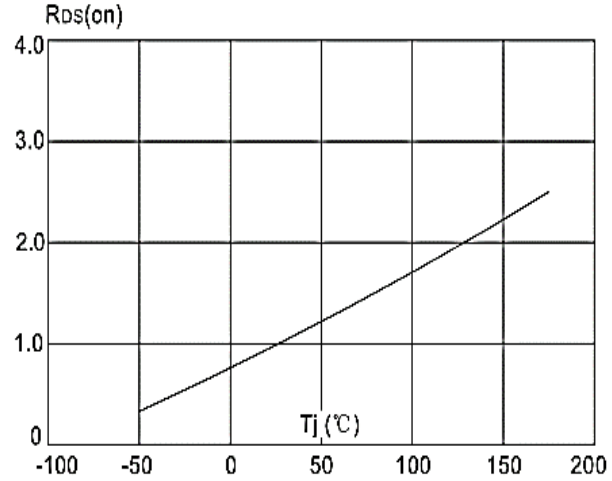


Figure 8: Normalized on Resistance vs. Junction Temperature

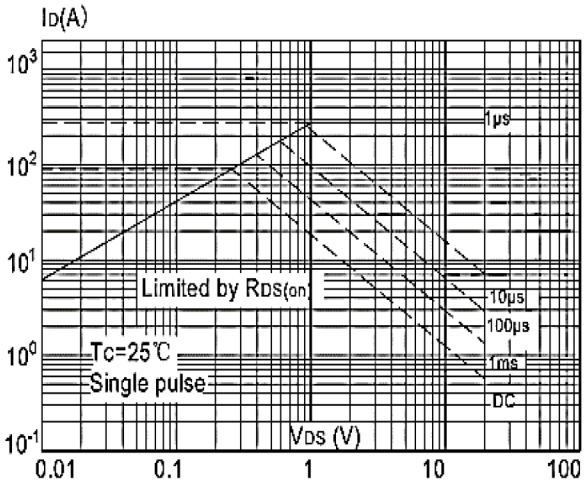


Figure 9: Maximum Safe Operating Area

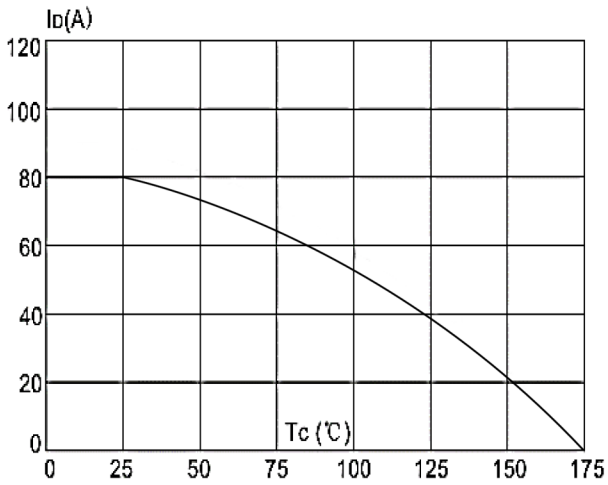


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

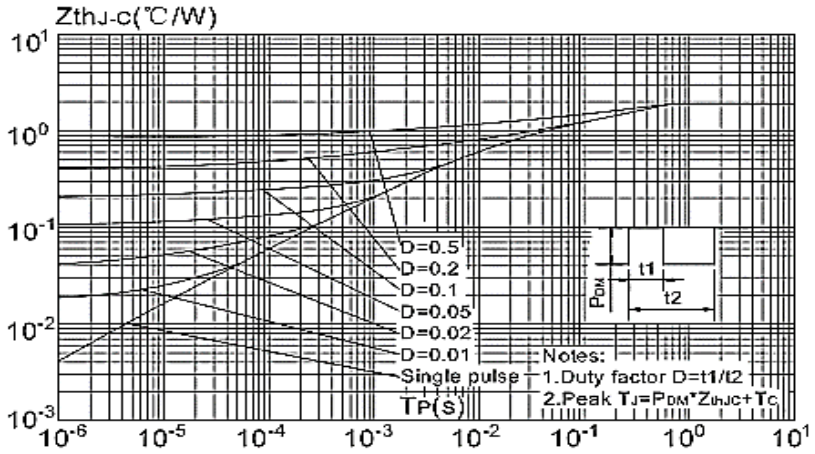
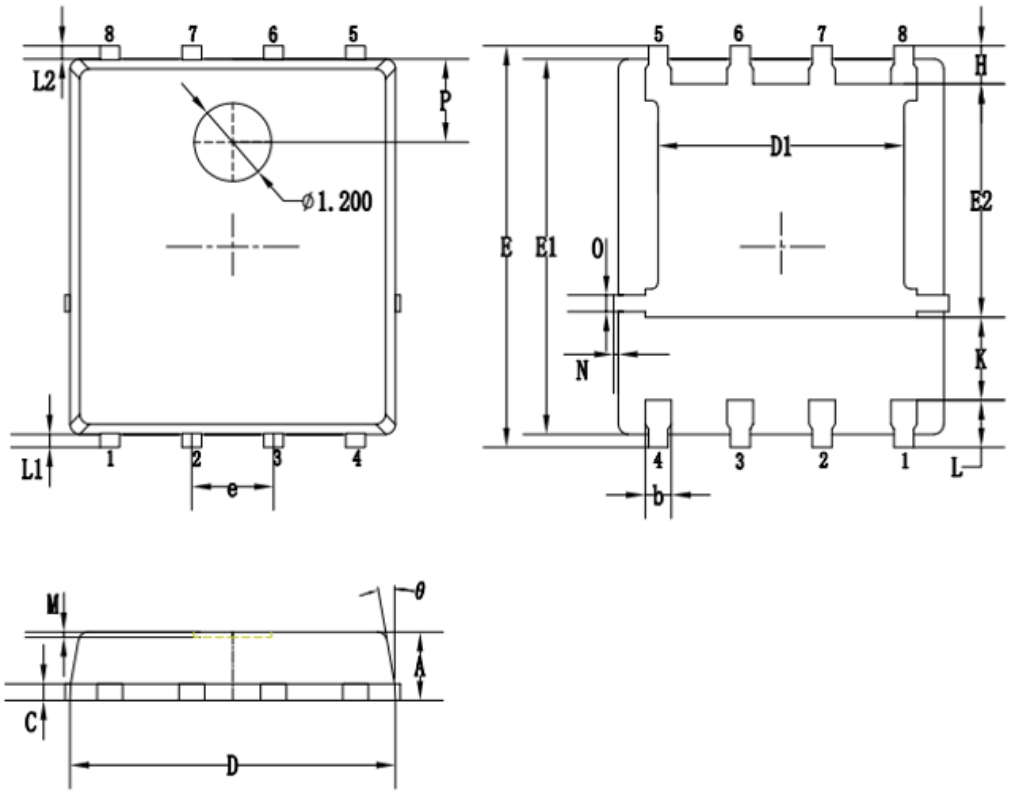


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien

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	3.72	3.82	3.92
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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