WSD46N10DN56

Dual N-Channel MOSFET

General Description

The WSD46N10DN56 is the highest performance SGT 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 WSD46N10DN56 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
100V	14mΩ	40A

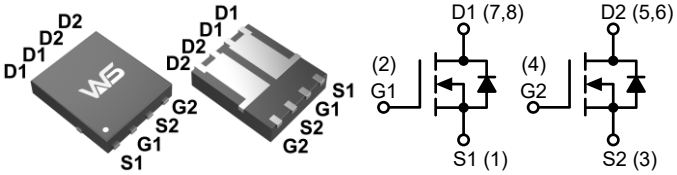
Applications

- DC-DC Converter.
- Motor Control.

Features

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

DFN5X6-8L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	±20	
I_D@T_C=25°C	Continuous Drain Current, V_{GS} @ 10V	40	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V	33	
I_{DM} [1]	Pulsed Drain Current	120	
E_{AS} [2]	Single Pulse Avalanche Energy	57	mJ
I_{AS} [2]	Avalanche Current	26	A
P_D@T_C=25°C	Total Power Dissipation	71	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	

Thermal Data

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$ [3]	Thermal Resistance Junction-ambient	---	25	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	1.7	

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	100	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C, I_D=1mA	---	0.098	---	V/°C
$R_{DS(ON)}$ [4]	Static Drain-Source On-Resistance	V_{GS}=10V , I_D=10A	---	14	20	mΩ
		V_{GS}=4.5V , I_D=7A	---	18	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250μA	1.2	1.5	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	5.52	---	mV/°C
I_{DSS}	Drain-Source Leakage Current	V_{DS}=80V , V_{GS}=0V , T_J=25°C	---	---	1.0	μA
		V_{DS}=80V , V_{GS}=0V , T_J=55°C	---	---	30	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
R_g [5]	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f = 1.0MHz	---	1.2	---	Ω
Q_g [5]	Total Gate Charge (10V)	V_{DS}=50V , V_{GS}=10V , I_D=5A	---	17	---	nC
Q_{gs} [5]	Gate-Source Charge		---	2.8	---	
Q_{gd} [5]	Gate-Drain Charge		---	4.1	---	
$T_{d(on)}$ [5]	Turn-On Delay Time	V_{DD}=30V , V_{GEN}=10V , R_G=6Ω , I_D=1A , R_L=30Ω	---	16	---	ns
T_r [5]	Rise Time		---	3.8	---	
$T_{d(off)}$ [5]	Turn-Off Delay Time		---	75	---	
T_f [5]	Fall Time		---	46	---	
C_{iss} [5]	Input Capacitance	V_{DS}=50V , V_{GS}=0V , f=1.0MHz	---	1010	---	pF
C_{oss} [5]	Output Capacitance		---	185	---	
C_{rss} [5]	Reverse Transfer Capacitance		---	12	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	30	A
V_{SD} [4]	Diode Forward Voltage	V_{GS}=0V , I_S=-1A , T_J=25°C	---	---	1.2	V
t_{rr}	Reverse Recovery Time	I_S=1A,dI/dt=100A/μs	---	49	---	ns
Q_{rr}	Reverse Recovery Charge		---	62	---	nC

Note:

1. Pulse width limited by max. junction temperature.
2. UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature T_J=25°C).
3. Surface Mounted on 1in^2 pad area.
4. Pulse test; pulse width≤300μs, duty cycle≤2%.
5. Guaranteed by design, not subject to production testing.

Typical Characteristics

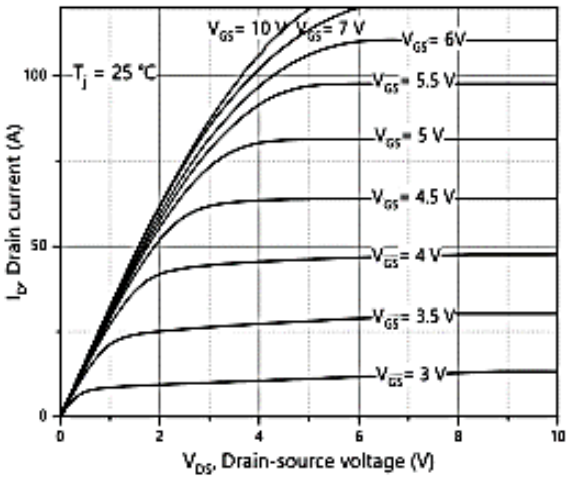


Figure 1, Typ. output characteristics

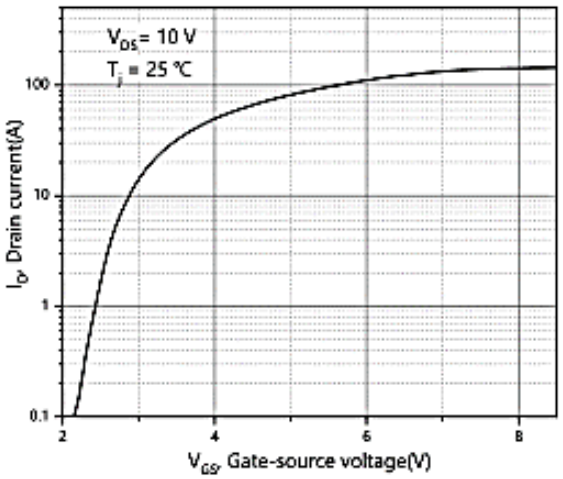


Figure 2, Typ. transfer characteristics

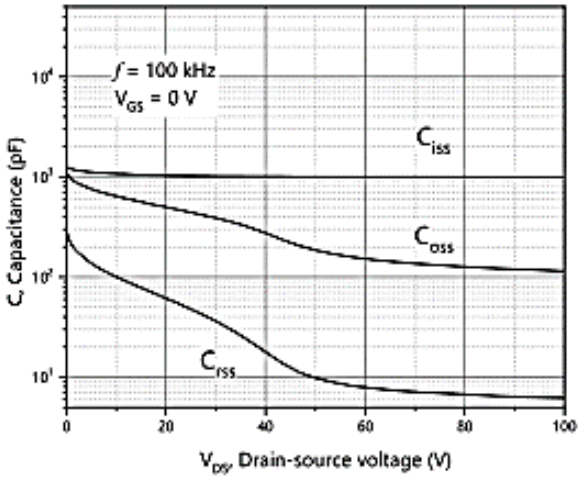


Figure 3, Typ. capacitances

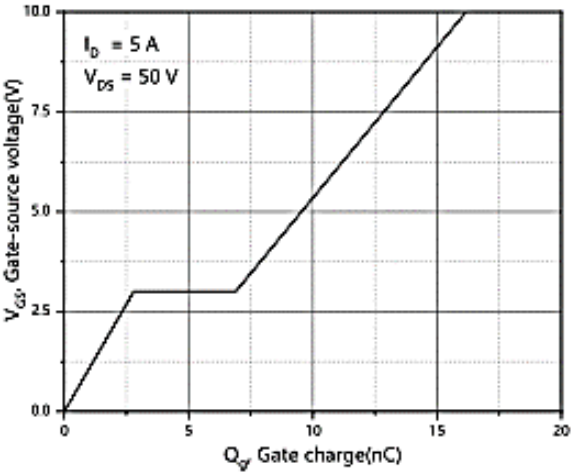


Figure 4, Typ. gate charge

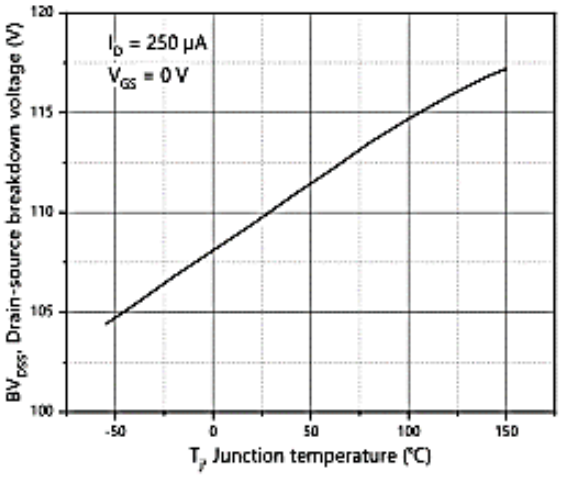


Figure 5, Drain-source breakdown voltage

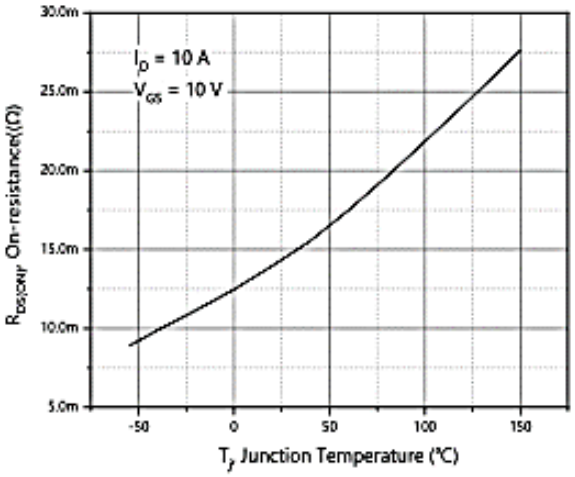


Figure 6, Drain-source on-state resistance

Typical Characteristics (Cont.)

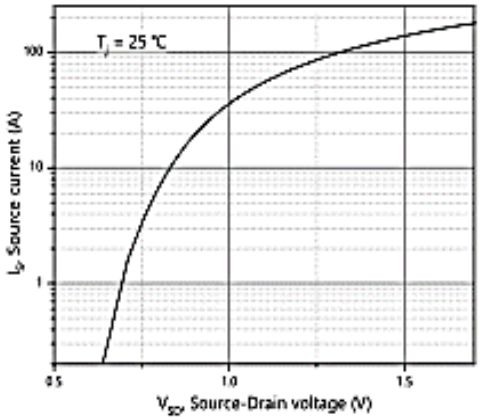


Figure 7, Forward characteristic of body diode

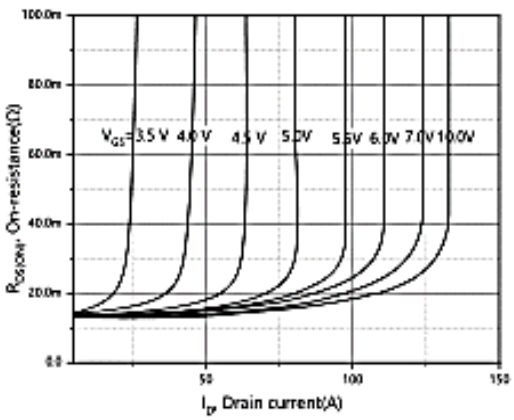


Figure 8, Drain-source on-state resistance

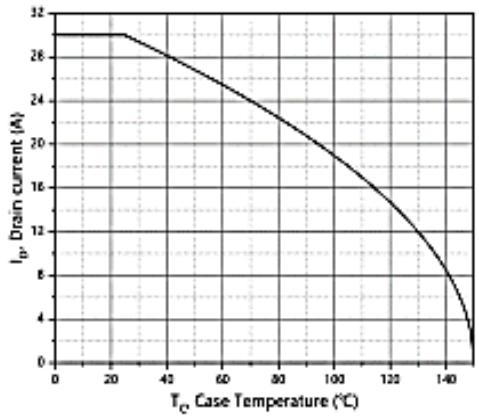


Figure 9, Drain current

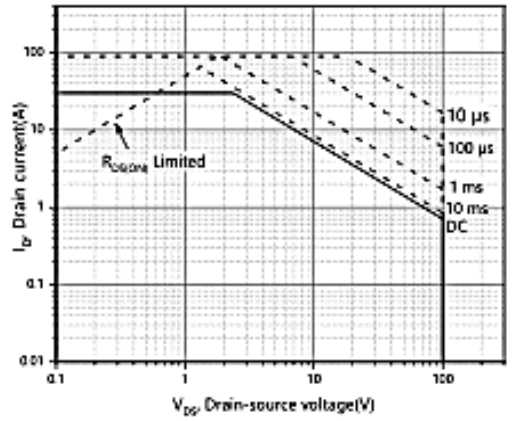
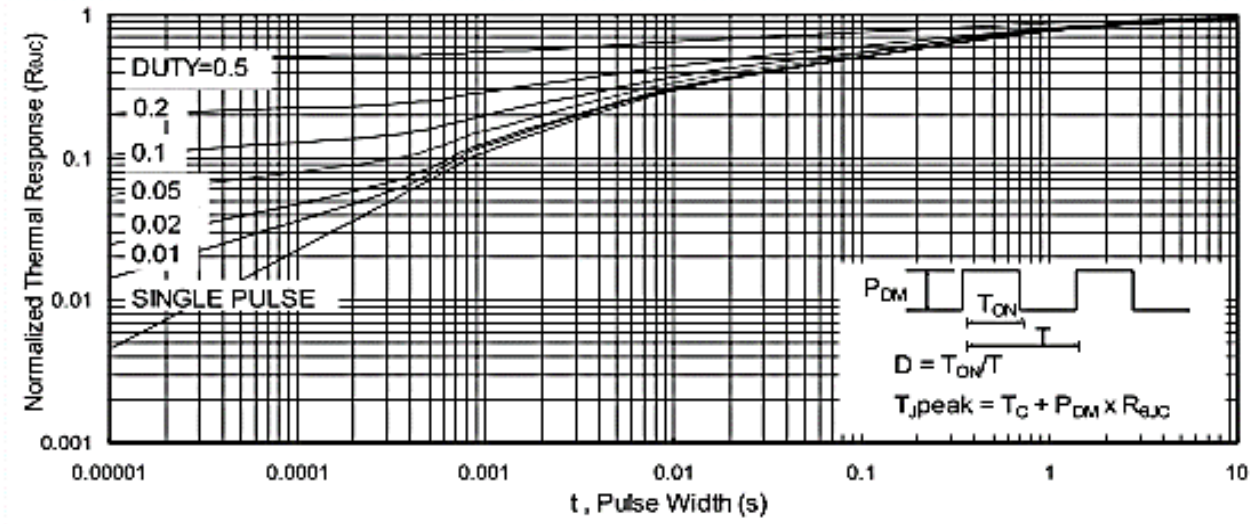
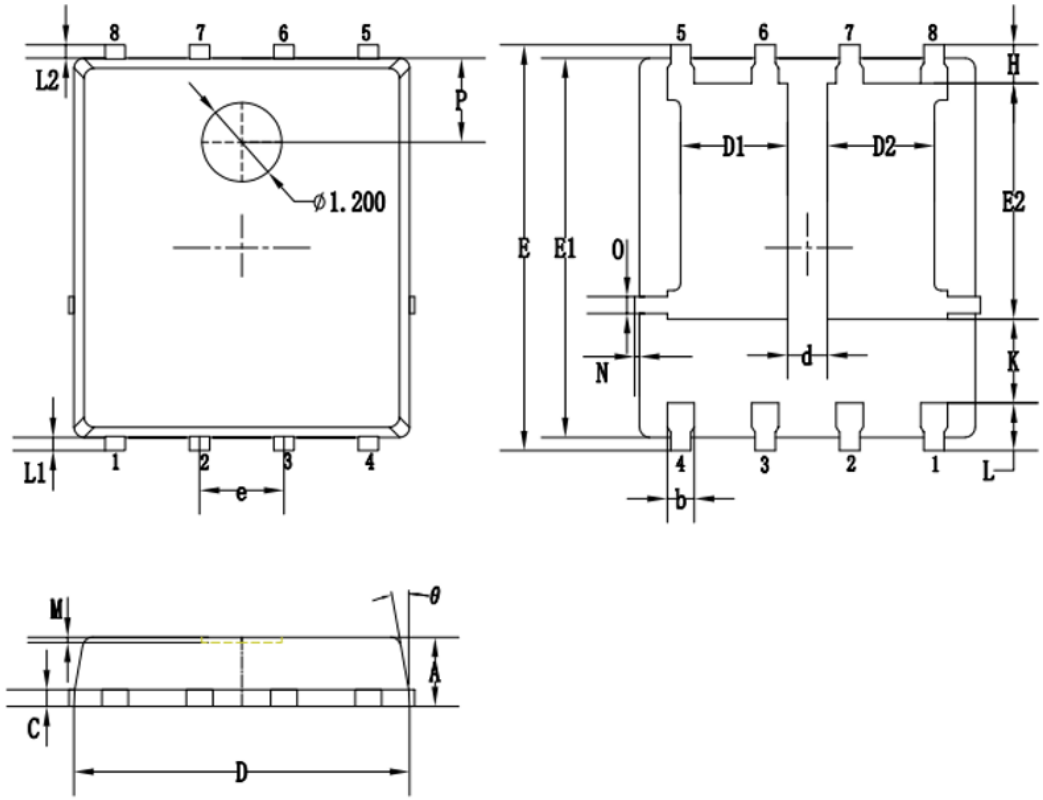


Figure 10, Safe operation area T_C=25 °C



Figu11. Normalized Maximum Transient Thermal Impedance

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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