

General Description

The WSC60N03 is the highest performance trench N-ch MOSFET with extreme high cell density, which provide excellent R_{DS(on)} and gate charge for most of the synchronous buck converter applications.

The WSC60N03 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

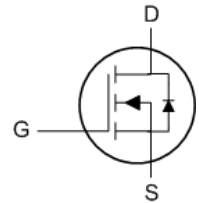
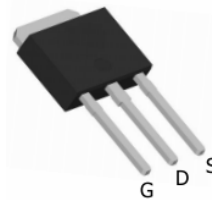
Product Summary

BVDSS	R _{DS(on)}	ID
30V	4.1mΩ	60A

Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

TO-251 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		10s	Steady State	
V _{DS}	Drain-Source Voltage	30		V
V _{GS}	Gate-Source Voltage	±20		V
I _D @T _C =25°C	Continuous Drain Current, V _{GS} @ 10V ¹	60		A
I _D @T _C =100°C	Continuous Drain Current, V _{GS} @ 10V ¹	48		A
I _D @T _A =25°C	Continuous Drain Current, V _{GS} @ 10V ¹	25	18	A
I _D @T _A =70°C	Continuous Drain Current, V _{GS} @ 10V ¹	18	14	A
I _{DM}	Pulsed Drain Current ²	120		A
EAS	Single Pulse Avalanche Energy ³	252		mJ
I _{AS}	Avalanche Current	48		A
P _D @T _C =25°C	Total Power Dissipation ⁴	50		W
P _D @T _A =25°C	Total Power Dissipation ⁴	3.5	2.5	W
T _{STG}	Storage Temperature Range	-55 to 175		°C
T _J	Operating Junction Temperature Range	-55 to 175		°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction-ambient (Steady State) ¹	---	62	°C/W
R _{θJA}	Thermal Resistance Junction-Ambient ¹ (t ≤ 10s)	---	25	°C/W
R _{θJC}	Thermal Resistance Junction-Case ¹	---	2.8	°C/W

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	30	---	---	V
ΔBV _{DSS} /ΔT _J	BVDSS Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.028	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =30A	---	4.1	5.7	mΩ
		V _{GS} =4.5V, I _D =15A	---	5	10	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.3	1.9	2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-6.16	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =24V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =24V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =30A	---	25	---	S
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	1.7	3.1	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =15V, V _{GS} =5V, I _D =15A	---	16.8	21.84	nC
Q _{gs}	Gate-Source Charge		---	6.08	7.9	
Q _{gd}	Gate-Drain Charge		---	4.93	6.41	
T _{d(on)}	Turn-On Delay Time	V _{DD} =15V, V _{GS} =10V, R _G =3.3Ω I _D =1A, R _L =15Ω	---	15.13	30.26	ns
T _r	Rise Time		---	4	8	
T _{d(off)}	Turn-Off Delay Time		---	45.27	90.54	
T _f	Fall Time		---	7.6	15.2	
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	2326	---	pF
C _{oss}	Output Capacitance		---	330	---	
C _{rss}	Reverse Transfer Capacitance		---	173	---	

Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy ⁵	V _{DD} =25V, L=0.1mH, I _{AS} =24A	63	---	---	mJ

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,6}	V _G =V _D =0V, Force Current	---	---	35	A
I _{SM}	Pulsed Source Current ^{2,6}		---	---	160	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1	V
t _{rr}	Reverse Recovery Time	IF=30A, dI/dt=100A/μs, T _J =25°C	---	30	---	nS
Q _{rr}	Reverse Recovery Charge		---	24	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper,t<10sec.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=24A
- 4.The power dissipation is limited by 175°C junction temperature
- 5.The Min. value is 100% EAS tested guarantee.
- 6.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

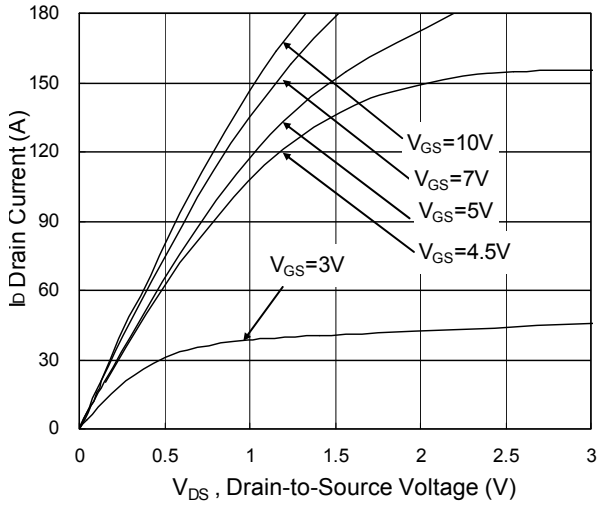


Fig.1 Typical Output Characteristics

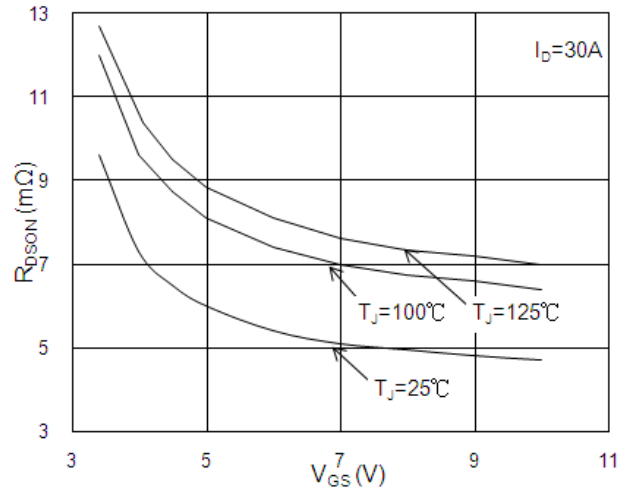


Fig.2 On-Resistance vs. G-S Voltage

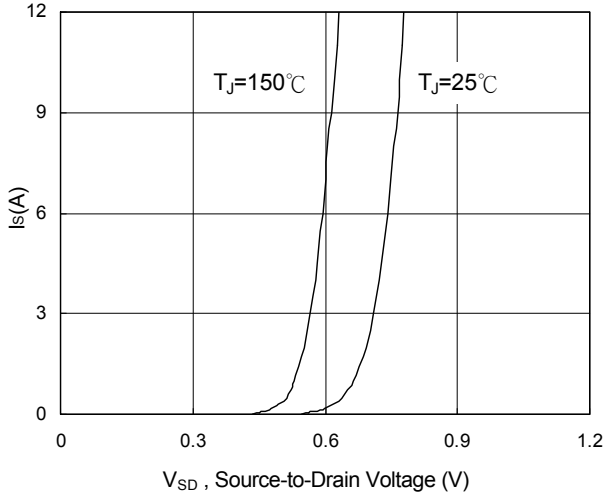


Fig.3 Forward Characteristics of Reverse

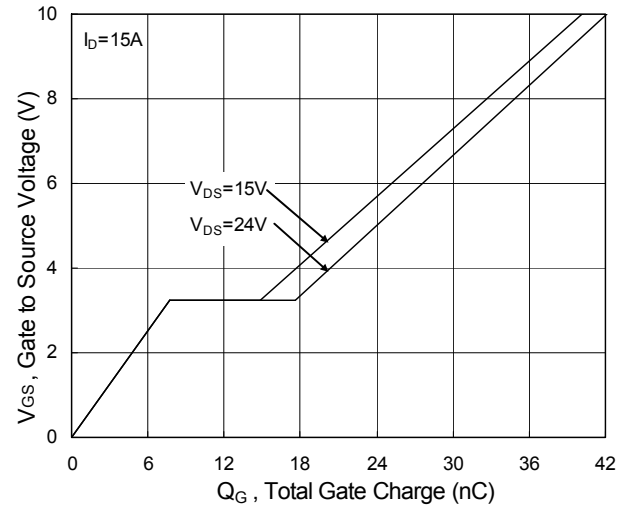


Fig.4 Gate-Charge Characteristics

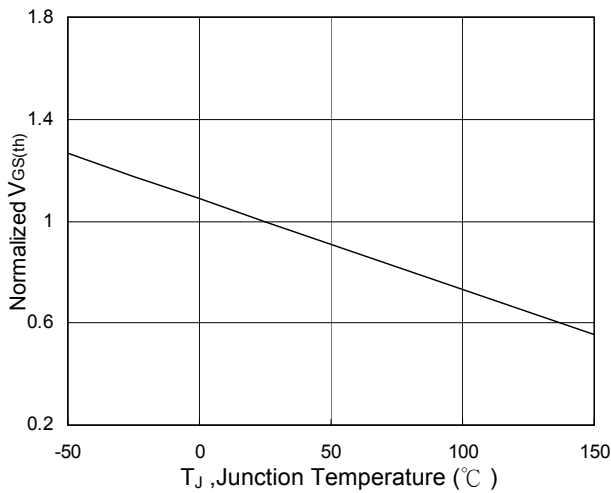


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

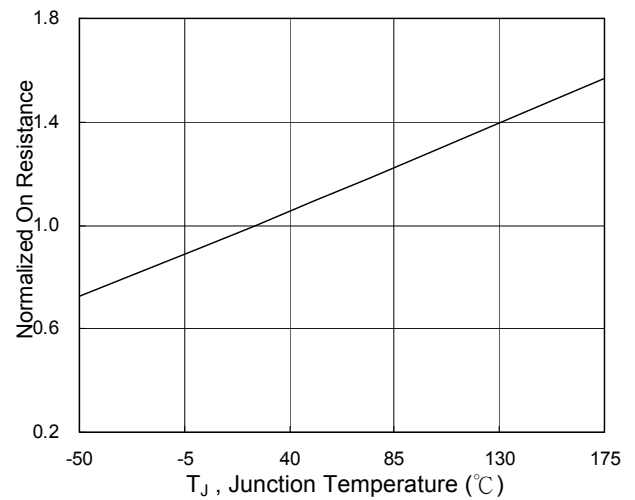


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

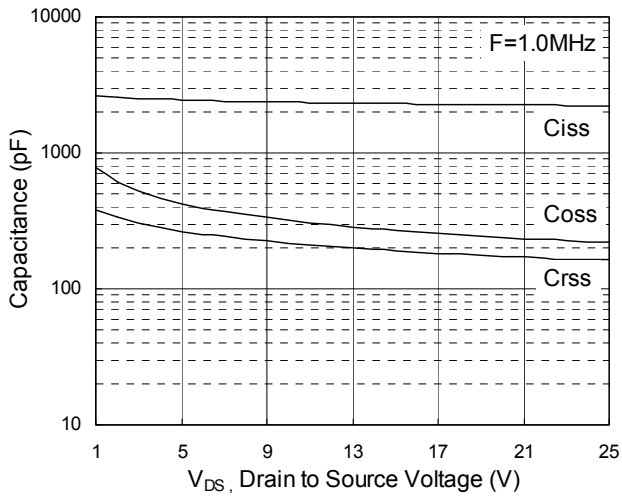


Fig.7 Capacitance

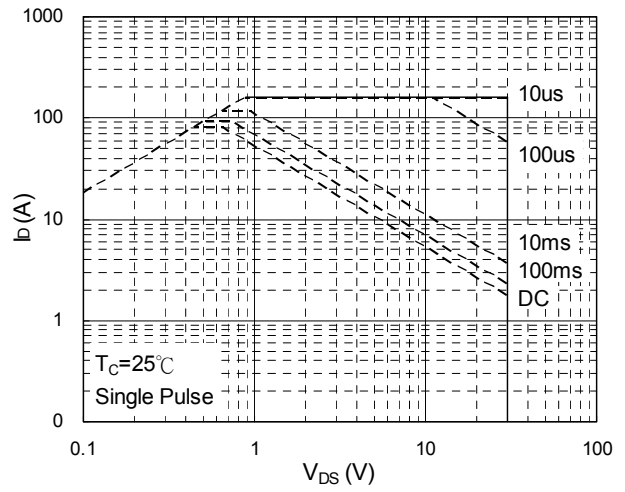


Fig.8 Safe Operating Area

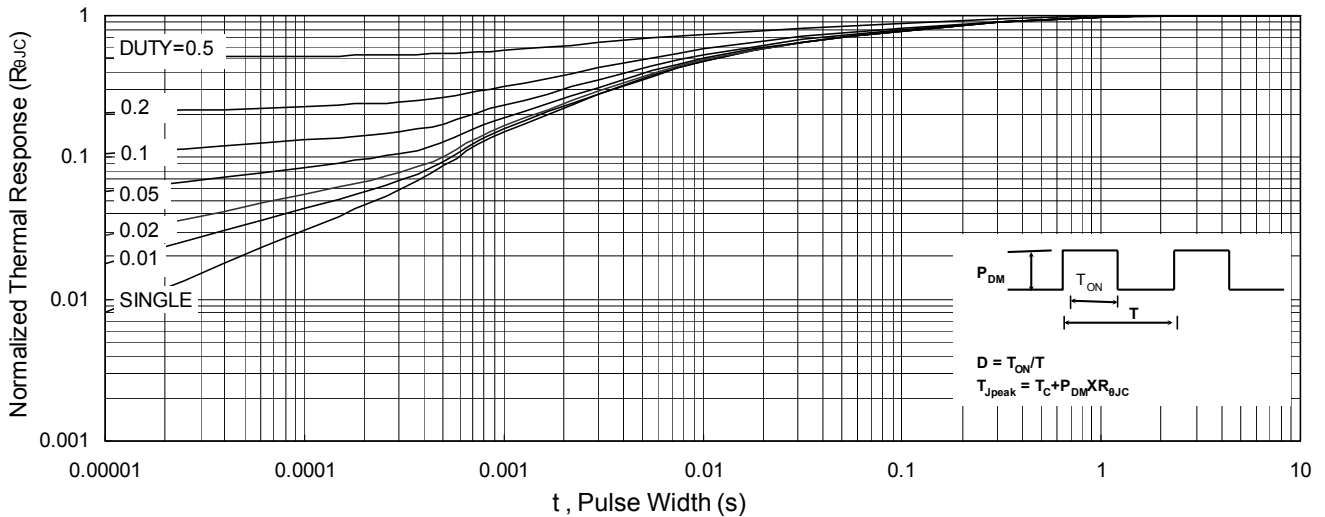


Fig.9 Normalized Maximum Transient Thermal Impedance

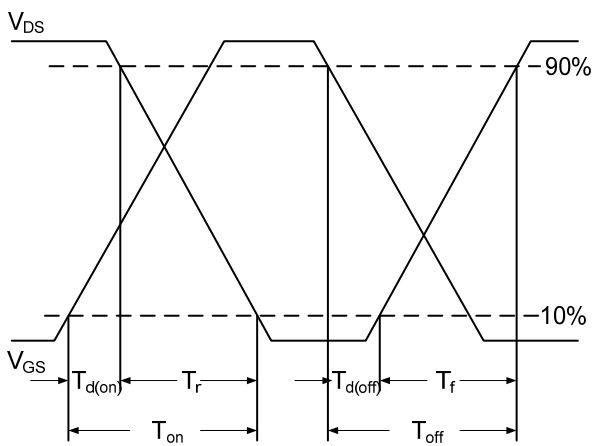


Fig.10 Switching Time Waveform

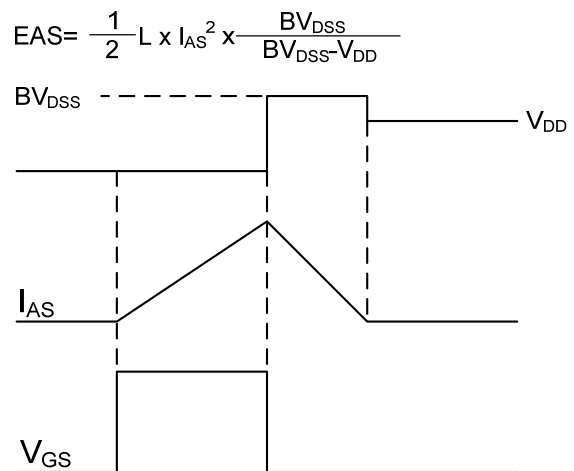


Fig.11 Unclamped Inductive Switching Waveform



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