General Description

The WSM320N04G is the highest performance trench N-Ch MOSFET with extreme high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications . The WSM320N04G 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

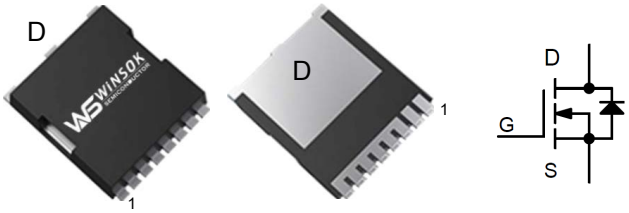
Product Summery

BVDSS	RDSON	ID
40V	1.2mΩ	320A

Applications

- High Frequency Point-of-Load Synchronous Buck Converter
- Networking DC-DC Power System
- Power Tool Application

TOLL Pin Configuration



1:G 2,3,4,5,6,7,8:S

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1,7]	320	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1,7]	192	A
I_{DM}	Pulsed Drain Current[2]	900	A
EAS	Single Pulse Avalanche Energy[3]	980	mJ
I_{AS}	Avalanche Current	70	A
P_D@T_C=25℃	Total Power Dissipation[4]	250	W
T_{STG}	Storage Temperature Range	-55 to 175	℃
T_J	Operating Junction Temperature Range	-55 to 175	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	55	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	0.6	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	40	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.050	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=25A	---	1.2	1.5	mΩ
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=4.5V , I_D=20A	---	1.7	2.5	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.7	2.6	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-6.94	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=40V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=40V , V_{GS}=0V , T_J=55℃	---	---	10	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=50A	---	160	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	1.0	---	Ω
Q_g	Total Gate Charge (10V)	V_{DS}=20V , V_{GS}=10V , I_D=25A	---	130	---	nC
Q_{gs}	Gate-Source Charge		---	43	---	
Q_{gd}	Gate-Drain Charge		---	83	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=20V , V_{GEN}=4.5V , R_G=2.7Ω, I_D=1A .	---	30	---	ns
T_r	Rise Time		---	115	---	
$T_{d(off)}$	Turn-Off Delay Time		---	95	---	
T_f	Fall Time		---	80	---	
C_{iss}	Input Capacitance	V_{DS}=20V , V_{GS}=0V , f=1MHz	---	8100	---	pF
C_{oss}	Output Capacitance		---	1200	---	
C_{rss}	Reverse Transfer Capacitance		---	800	---	

Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy[5]	V_{DD}=20V , L=0.5mH , I_{AS}=70A	500	---	---	mJ

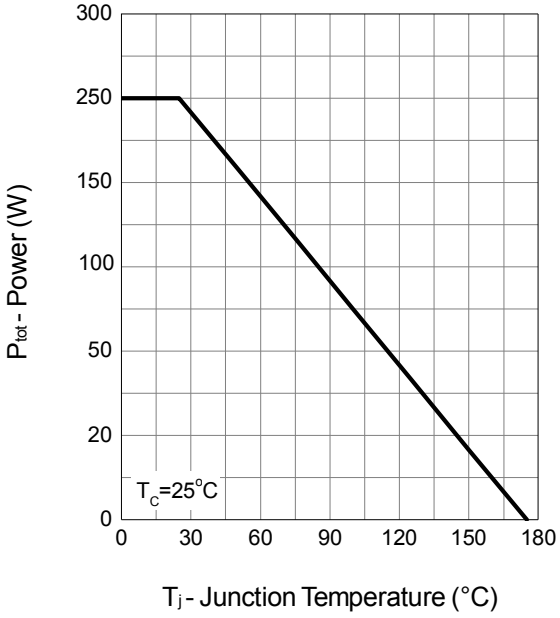
Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,6]	V_G=V_D=0V , Force Current	---	---	320	A
I_{SM}	Pulsed Source Current[2,6]		---	---	900	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=30A , T_J=25℃	---	---	1.2	V

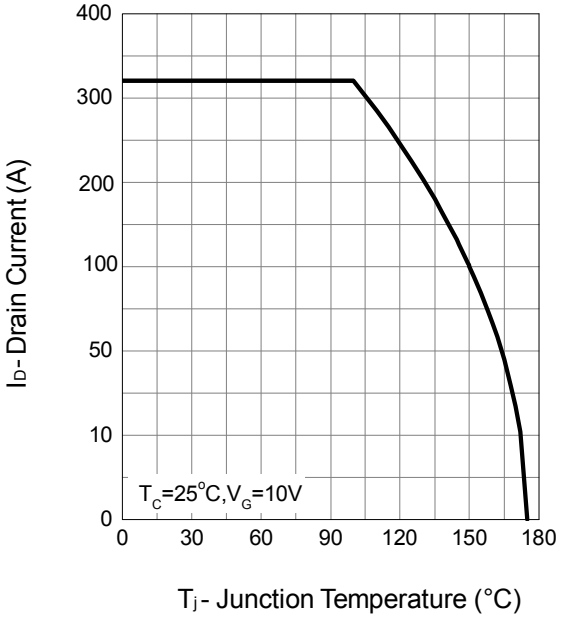
Note :
1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper,t<10sec .
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.The EAS data shows Max. rating . The test condition is V_{DD}=20V,V_{GS}=10V,L=0.5mH,I_{AS}=70A
4.The power dissipation is limited by 150℃ 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.
7.Package limitation current is 100A.

Typical Operating Characteristics

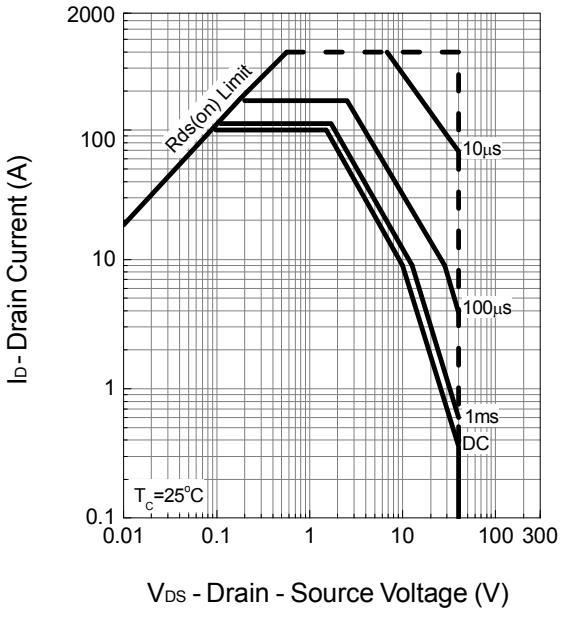
Power Dissipation



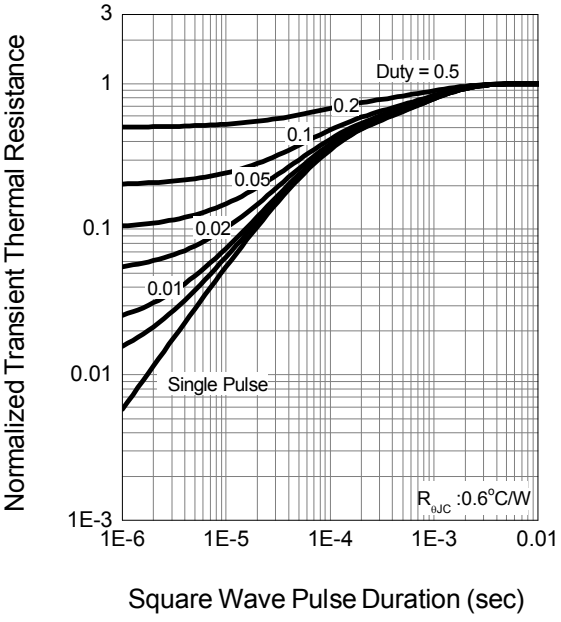
Drain Current



Safe Operation Area

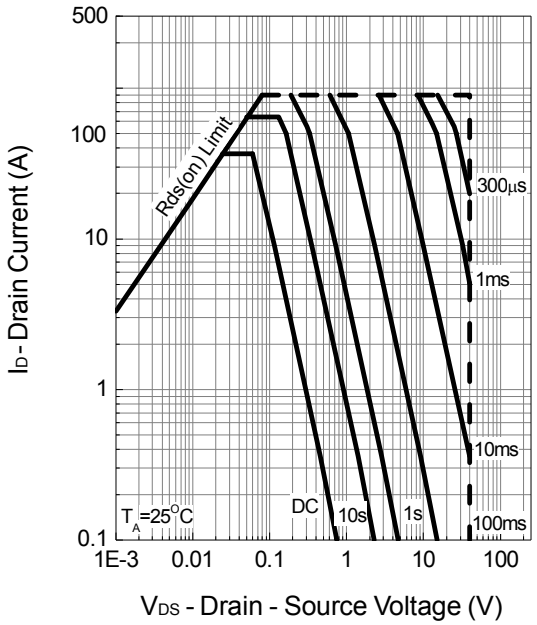


Thermal Transient Impedance

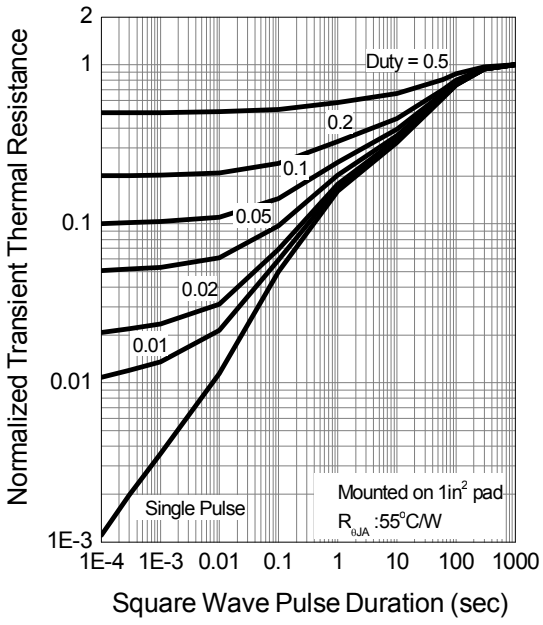


Typical Operating Characteristics

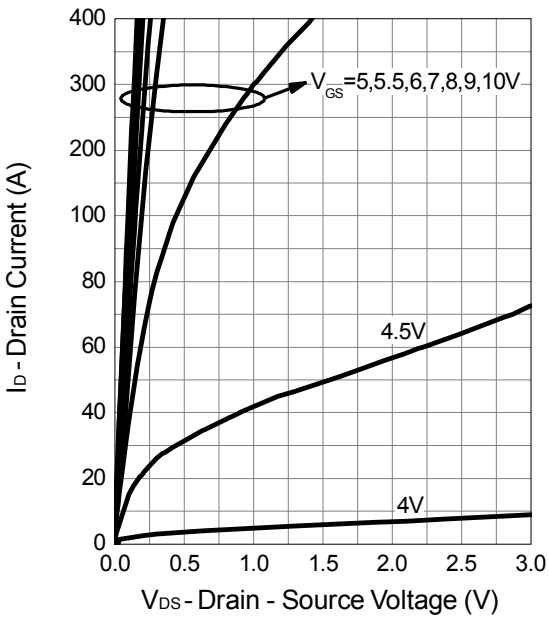
Safe Operation Area



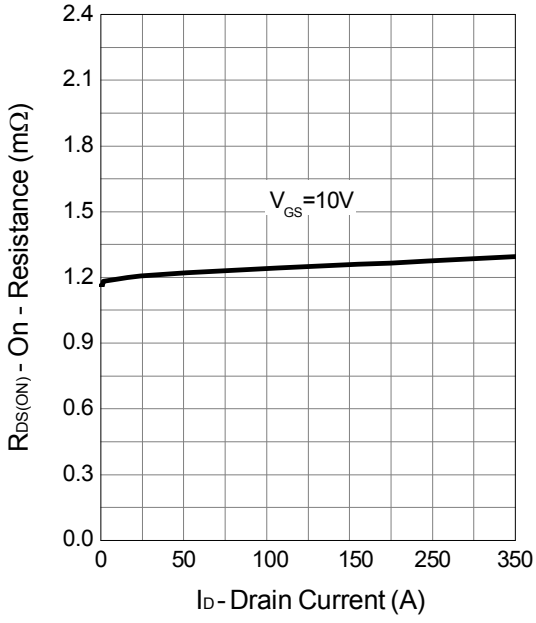
Thermal Transient Impedance



Output Characteristics

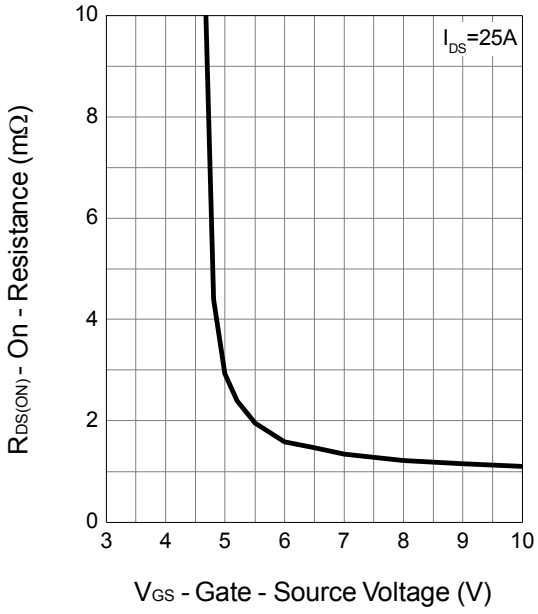


Drain-Source On Resistance

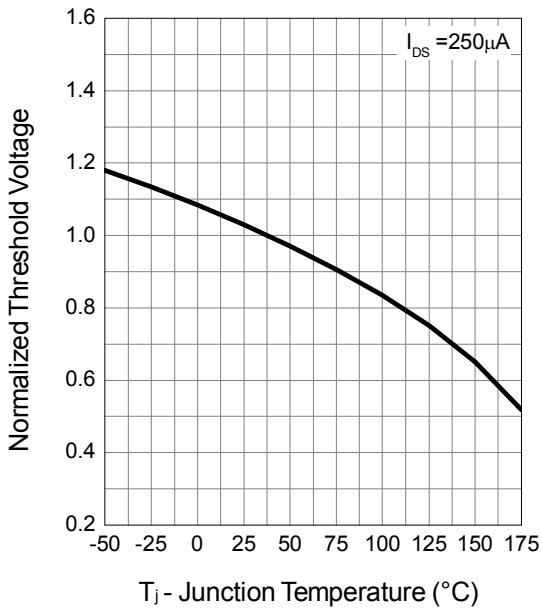


Typical Operating Characteristics

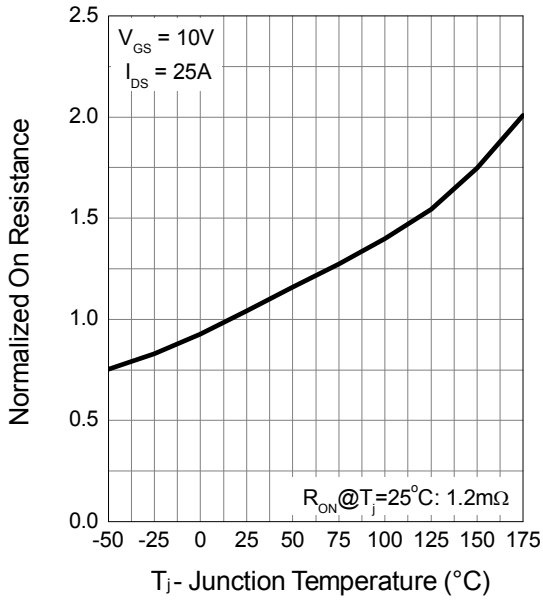
Gate-Source On Resistance



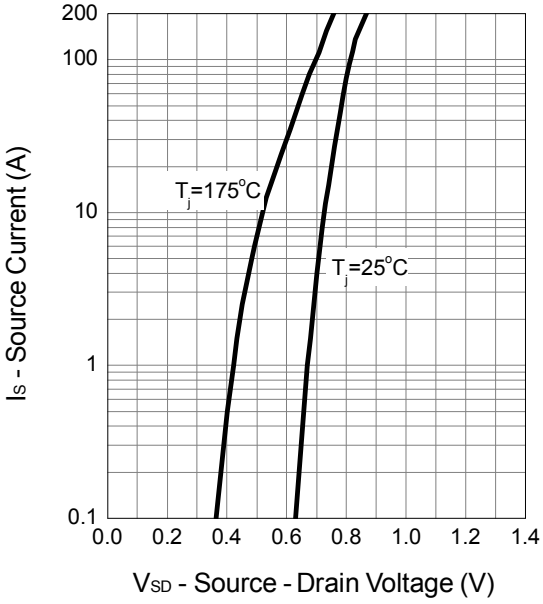
Gate Threshold Voltage



Drain-Source On Resistance

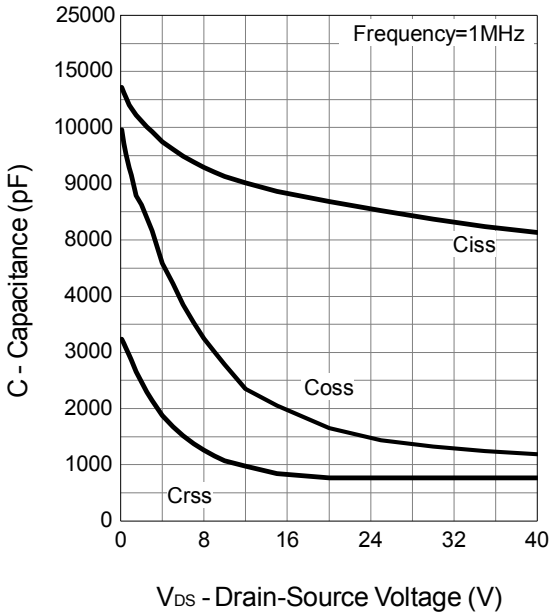


Source-Drain Diode Forward

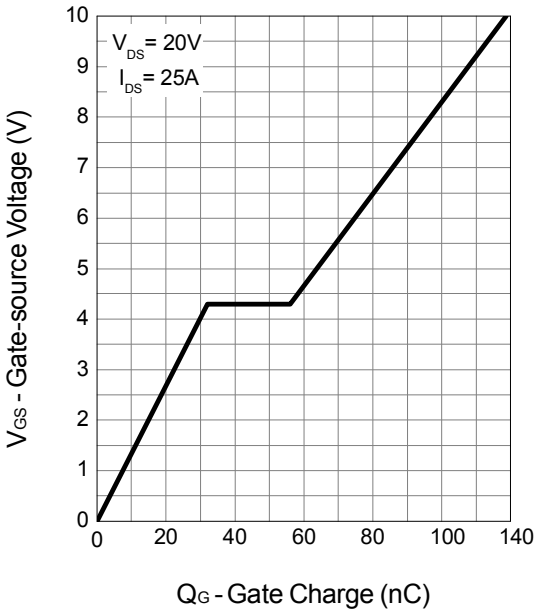


Typical Operating Characteristics

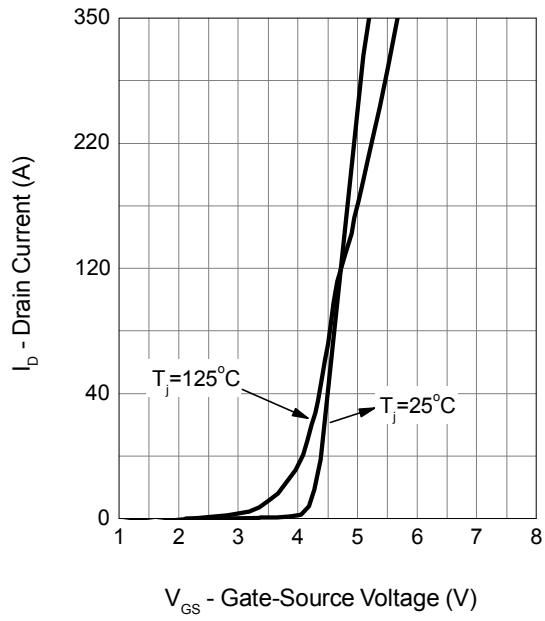
Capacitance



Gate Charge



Transfer Characteristics



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