Please visit our website for more information: www.upi-semi.com

QN3109M6N

N-Channel 30V Fast Switching MOSFET

General Description

The QN3109M6N is a high performance trench N-channel MOSFET which utilizes extremely high cell density to provide low Rdson and gate charge characteristics. It is ideally suited to support synchronous buck converter applications.

The QN3109M6N meets RoHS and Green Product requirements while supporting full function reliability.

Features

- ✓ Advanced high cell density Trench technology
- ✓ Super Low Gate Charge
- ✓ Green Device Available

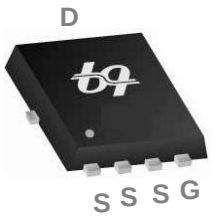
Product Summary

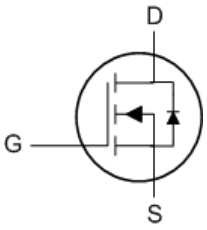
V_{DS}	$R_{DS(ON)}$ max (V_{GS}=10V)	I_D (T_C=25 °C)
30V	1.62mΩ	145A

Applications

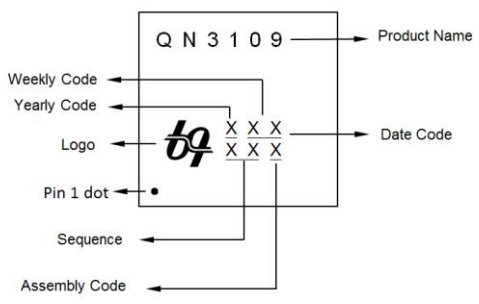
- ✓ High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- ✓ Networking DC-DC Power System
- ✓ Load Switch

Pin Configuration





Ordering Information

Order Number	Package Type	Top Marking
QN3109M6N	PRPAK5X6	

QN3109M6N

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
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[1,7]	145	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V[1,7]	91	A
I_D@T_A=25°C	Continuous Drain Current, V_{GS} @ 10V[1]	28	A
I_D@T_A=70°C	Continuous Drain Current, V_{GS} @ 10V[1]	22	A
I_{DM}	Pulsed Drain Current[2]	290	A
EAS	Single Pulse Avalanche Energy[3]	270.1	mJ
I_{AS}	Avalanche Current	73.5	A
P_D@T_C=25°C	Total Power Dissipation[4]	54	W
P_D@T_A=25°C	Total Power Dissipation[4]	2	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient[1]	45	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	1.8	2.3	°C/W

QN3109M6N

N-Channel Electrical Characteristics

N-Channel 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	30	--	--	V
$\triangle BV_{DSS}/\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25°C, I_D=1mA	--	0.008	--	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V, I_D=30A	--	1.35	1.62	mΩ
		V_{GS}=4.5V, I_D=15A	--	1.9	2.5	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS}, I_D =250uA	1.2	--	2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		--	-5.3	--	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
gfs	Forward Transconductance	V_{DS}=5V, I_D=15A	--	62	--	S
R_g	Gate Resistance	V_{DS}=0V, V_{GS}=0V, f=1MHz	--	1.0	--	Ω
Q_g	Total Gate Charge (10V)	V_{DS}=15V, V_{GS}=10V, I_D=15A	--	46.3	--	nC
Q_g	Total Gate Charge (4.5V)	V_{DS}=15V, V_{GS}=4.5V, I_D=15A	--	21.8	--	
Q_{gs}	Gate-Source Charge		--	8.1	--	
Q_{gd}	Gate-Drain Charge		--	6.8	--	
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=15V, V_{GS}=10V, R_G=3.3Ω, I_D=15A	--	12.7	--	ns
t_r	Rise Time		--	44.4	--	
$t_{d(off)}$	Turn-Off Delay Time		--	34.8	--	
t_f	Fall Time		--	7.7	--	
C_{iss}	Input Capacitance	V_{DS}=15V, V_{GS}=0V, f=1MHz	--	3100	--	pF
C_{oss}	Output Capacitance		--	1482	--	
C_{rss}	Reverse Transfer Capacitance		--	44	--	

QN3109M6N

Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy[5]	V_{DD}=25V , L=0.1mH , I_{AS}=42.1A	88.62	--	--	mJ

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current [1,6]	V_G=V_D=0V, Force Current	--	--	145	A
I_{SM}	Pulsed Source Current[2,6]		--	--	290	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V, I_S=1A, T_J=25℃	--	--	1.2	V
t_{rr}	Reverse Recovery Time	I_F=15A, di/dt=100A/μs, T_J=25℃	--	54.8	--	nS
Q_{rr}	Reverse Recovery Charge		--	67.1	--	nC

Note:

1. Test data conducted with surface mount attachment to 1 inch^2, FR-4 board utilizing 2oz copper
2. Pulse Test. Pulse width ≦ 300uS, duty cycle ≦ 2%
3. EAS data is a maximum rating. The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1mH
4. The power dissipation is limited by a 150°C maximum 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, it will be limited by total power
7. The maximum current rating is package limited.

QN3109M6N

Typical Characteristics

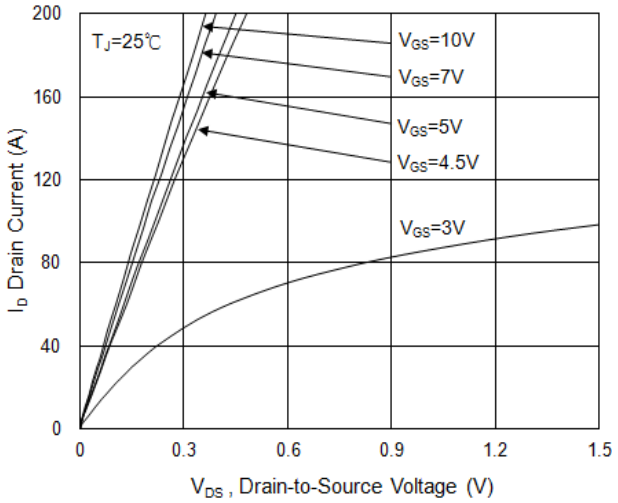


Fig.1: Typical Output Characteristics

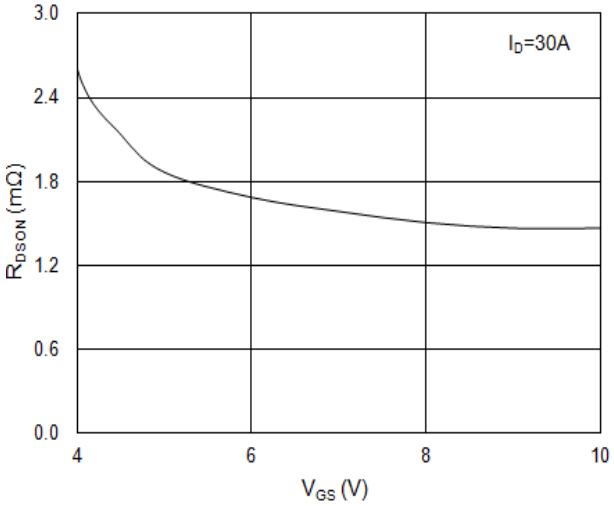


Fig.2: On-Resistance vs. Gate-Source

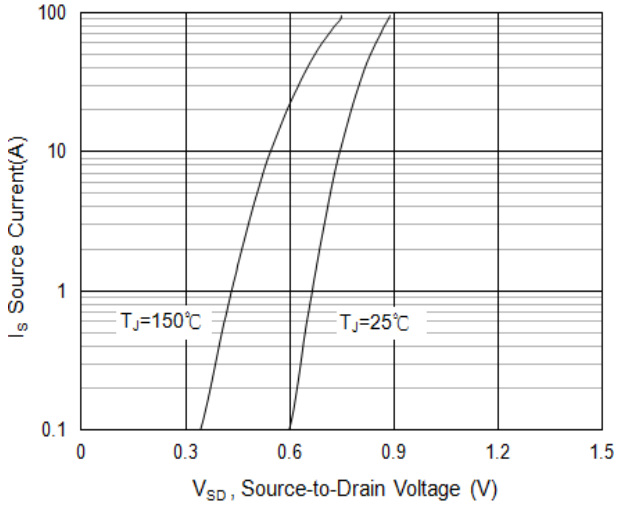


Fig.3: Forward Characteristics of Reverse

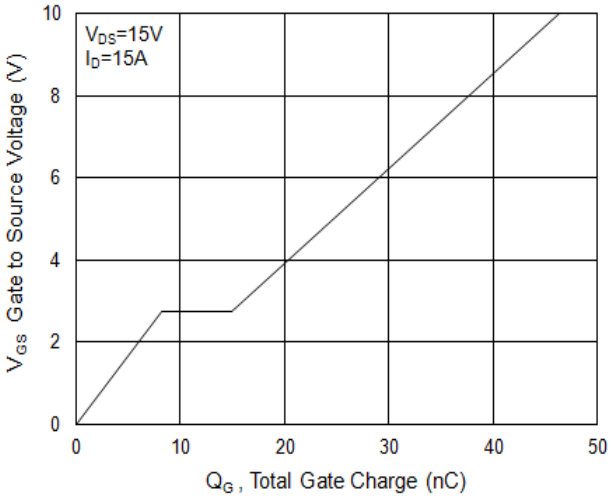


Fig.4: Gate-Charge Characteristics

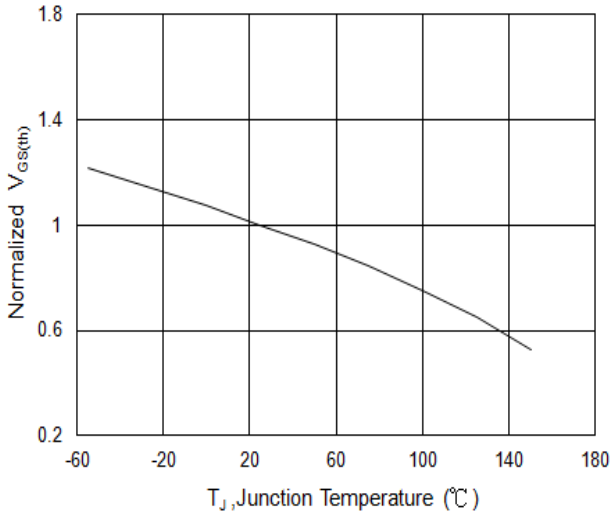


Fig.5: Normalized $V_{GS(th)}$ vs. T_J

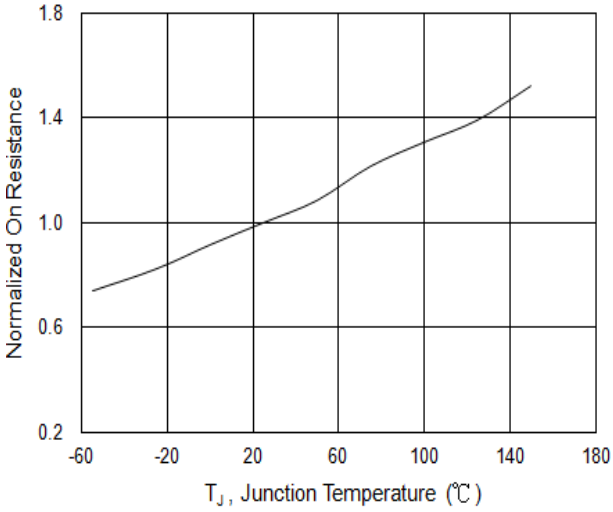


Fig.6: Normalized R_{DSON} vs. T_J

QN3109M6N

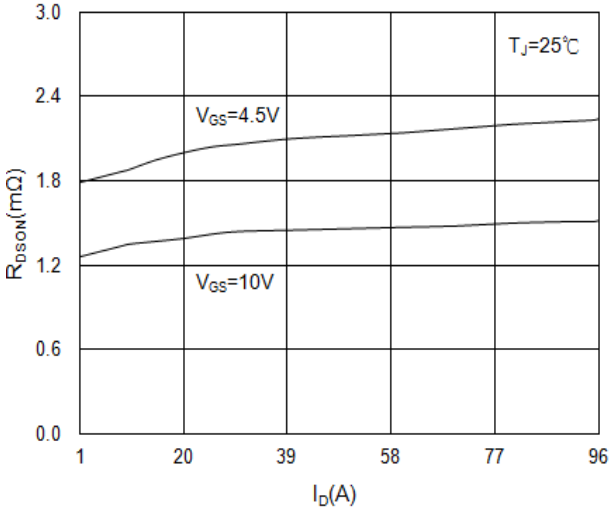


Fig.7: Drain-Source On-State Resistance

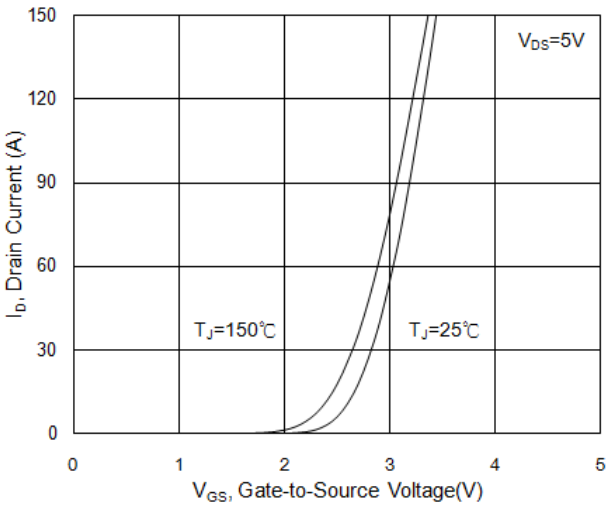


Fig.8: Transfer Characteristics

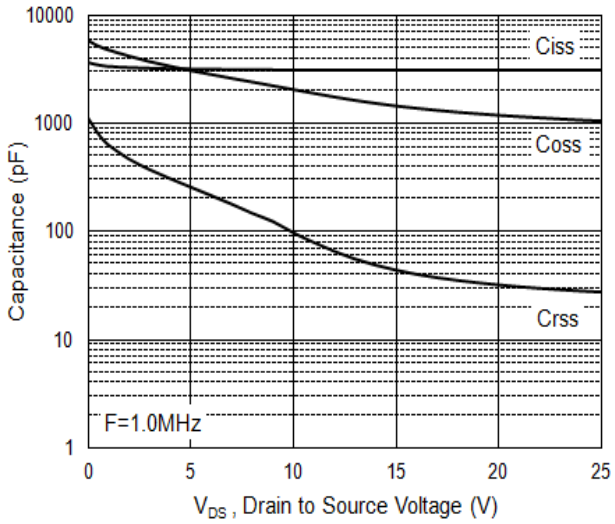


Fig.9: Capacitance

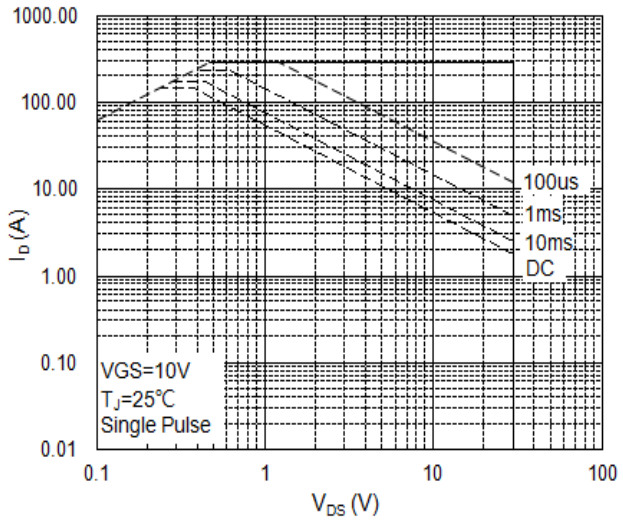


Fig.10: Safe Operating Area

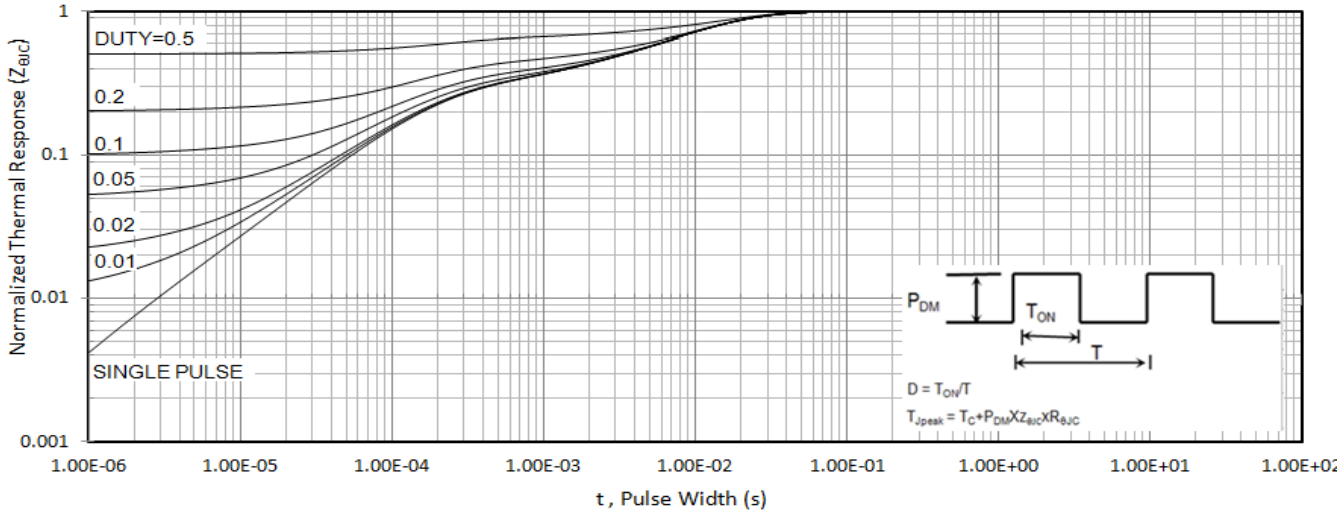


Fig.11: Transient Thermal Impedance

Legal Notice

The contents of this document are provided in connection with uPI Semiconductor Corp. (“uPI”) products. uPI makes no representations or warranties with respect to the accuracy or completeness of the contents of this publication and reserves the right to make changes to specifications and product descriptions at any time without notice.

No license, whether express, implied, arising by estoppel or otherwise, to any intellectual property rights, is granted by this publication. Except as provided in uPI’s terms and conditions of sale for such products, uPI assumes no liability whatsoever, and uPI disclaims any express or implied warranty relating to sale and/or use of uPI products, including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright or other intellectual property right. uPI products are not designed, intended, authorized or warranted for use as components in systems intended for medical, life-saving, or life sustaining applications. uPI reserves the right to discontinue or make changes to its products at any time without notice.

Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.

uPI Semiconductor Corp.

9F.,No.5, Taiyuan 1st St. Zhubei City, Hsinchu, Taiwan, R.O.C.

TEL : 886.3.560.1666 FAX : 886.3.560.1888