

QN3107M6N

N-Channel 30V Fast Switching MOSFET

General Description

The QN3107M6N is a high performance trench N-channel MOSFET which utilizes extremely high cell density to provide low R_{DS(on)} and gate charge characteristics. It is ideally suited to support synchronous buck converter applications.

The QN3107M6N 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

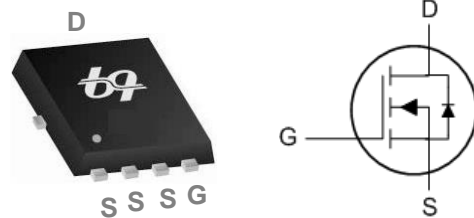
Product Summary

V _{DS}	R _{DS(ON)} max (V _{GS} =10V)	I _D (T _C =25 °C)
30V	2.6mΩ	118A

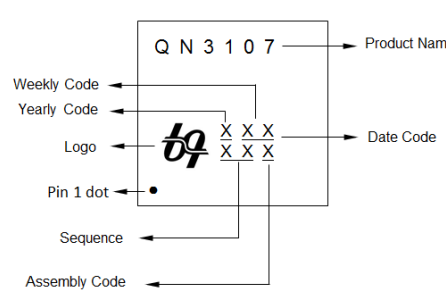
Applications

- ✓ 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
QN3107M6N	PRPAK5X6	

QN3107M6N-DS-F0000, Jul. 2019

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Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	118	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	74	A
$I_D@T_A=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	22	A
$I_D@T_A=70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	17	A
I_{DM}	Pulsed Drain Current ²	236	A
EAS	Single Pulse Avalanche Energy ³	155.1	mJ
I_{AS}	Avalanche Current	55.7	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ⁴	56	W
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation ⁴	2.0	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	44	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	2.2	2.5	$^\circ\text{C/W}$

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N-Channel Electrical Characteristics

N-Channel Electrical Characteristics: ($T_J=25\text{ }^\circ\text{C}$, unless otherwise noted)							
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	--	--	V	
$\Delta BV_{DSS} / \Delta T_J$	BVDSS Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	--	0.01	--	$V/^\circ\text{C}$	
$R_{DS(ON)}$	Static Drain-Source	$V_{GS}=10V, I_D=30A$	--	2.1	2.6	m Ω	
	On-Resistance ²	$V_{GS}=4.5V, I_D=15A$	--	2.9	3.8		
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	--	2.5	V	
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		--	-4.6	--	$\text{mV}/^\circ\text{C}$	
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=24V, V_{GS}=0V, T_J=25^\circ\text{C}$	--	--	1	μA	
		$V_{DS}=24V, V_{GS}=0V, T_J=55^\circ\text{C}$	--	--	5		
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	± 100	nA	
gfs	Forward Transconductance	$V_{DS}=5V, I_D=15A$	--	47.5	--	S	
R_g	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	--	0.9	--	Ω	
Q_g	Total Gate Charge (10V)	$V_{DS}=15V, V_{GS}=10V, I_D=15A$	--	31.4	--	nC	
Q_g	Total Gate Charge (4.5V)		--	15.1	--		
Q_{gs}	Gate-Source Charge		$V_{DS}=15V, V_{GS}=4.5V, I_D=15A$	--	5.4		--
Q_{gd}	Gate-Drain Charge			--	5.2		--
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=15V, V_{GS}=10V, R_G=3.3\Omega,$ $I_D=15A$	--	10.8	--	ns	
t_r	Rise Time		--	44.6	--		
$t_{d(off)}$	Turn-Off Delay Time		--	25.3	--		
t_f	Fall Time		--	6.1	--		
C_{iss}	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$	--	1950	--	pF	
C_{oss}	Output Capacitance		--	1120	--		
C_{rss}	Reverse Transfer Capacitance		--	42	--		

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Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy ⁵	$V_{DD}=25V$, $L=0.1mH$, $I_{AS}=35A$	61.25	--	--	mJ

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,6}	$V_G=V_D=0V$, Force Current	--	---	118	A
I_{SM}	Pulsed Source Current ^{2,6}		--	---	236	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=1A$, $T_J=25^\circ C$	--	---	1.2	V
t_{rr}	Reverse Recovery Time	$I_F=15A$, $di/dt=100A/\mu s$, $T_J=25^\circ C$	--	73.6	--	nS
Q_{rr}	Reverse Recovery Charge		--	62.3	--	nC

Note:

1. Test data conducted with surface mount attachment to 1 inch², FR-4 board utilizing 2oz copper
2. Pulse Test. Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
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

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Typical Characteristics

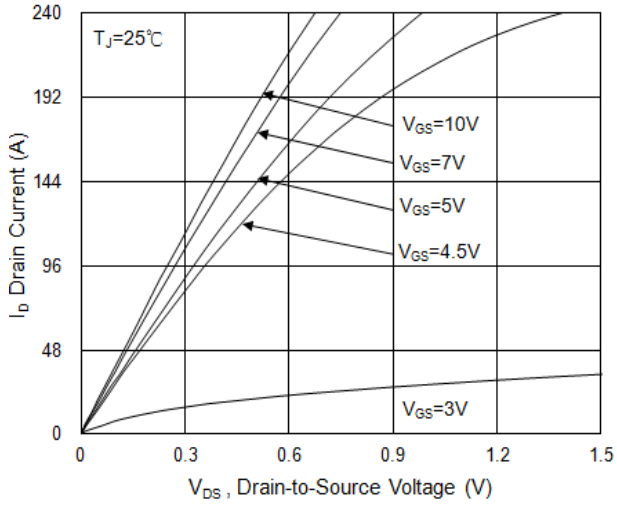


Fig.1: Typical Output Characteristics

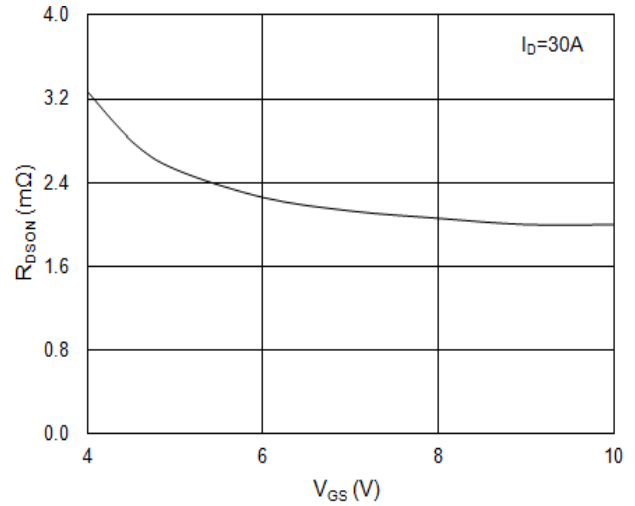


Fig.2: On-Resistance vs. Gate-Source

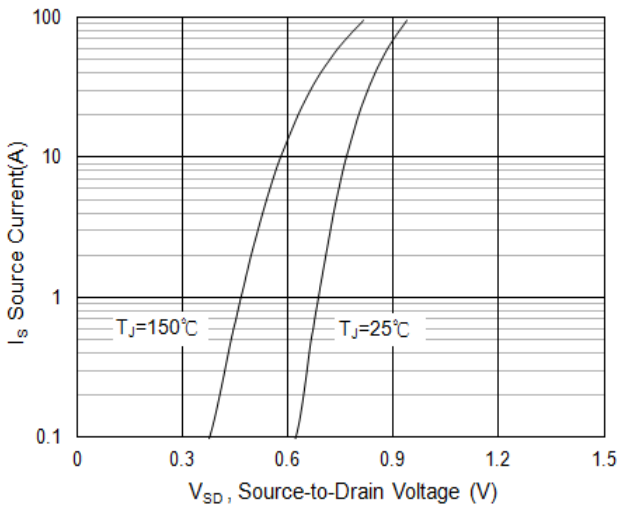


Fig.3: Forward Characteristics of Reverse

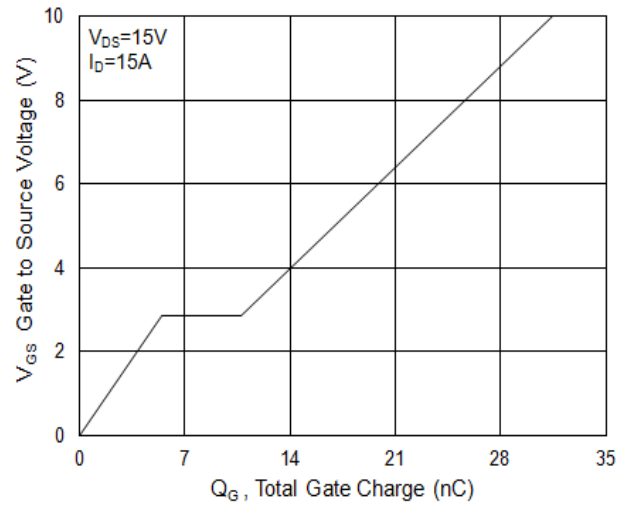


Fig.4: Gate-Charge Characteristics

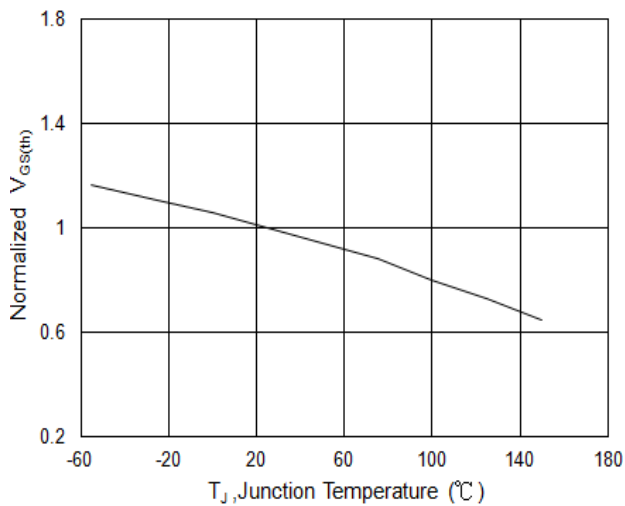


Fig.5: Normalized $V_{GS(th)}$ vs. T_J

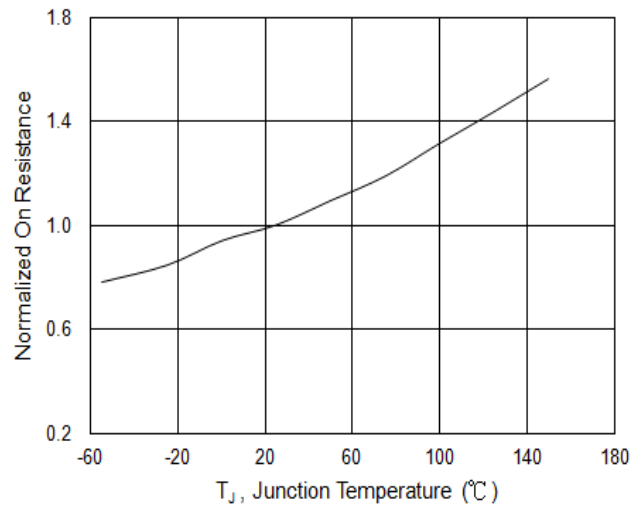


Fig.6: Normalized $R_{DS(on)}$ vs. T_J

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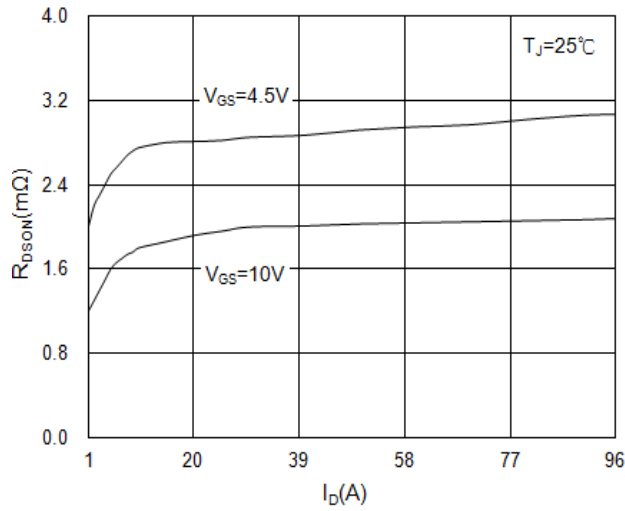


Fig.7: Drain-Source On-State Resistance

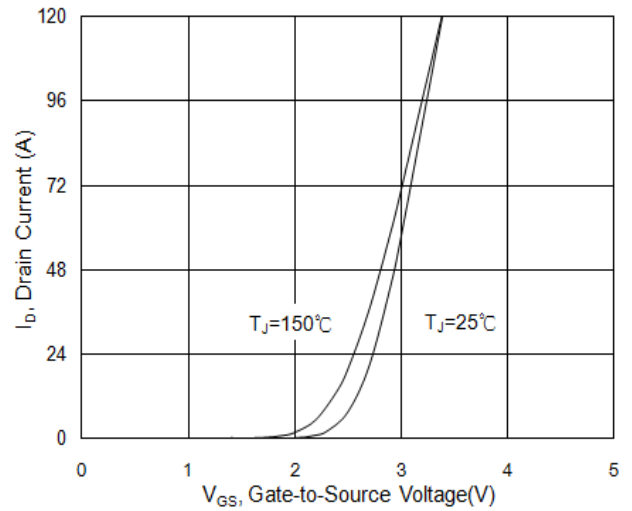


Fig.8: Transfer Characteristics

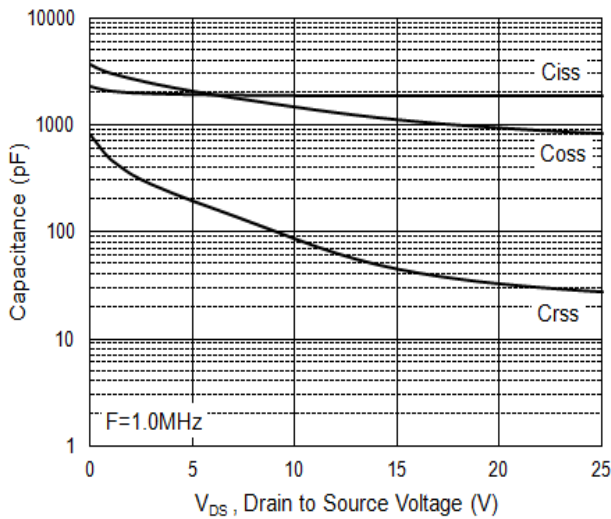


Fig.9: Capacitance

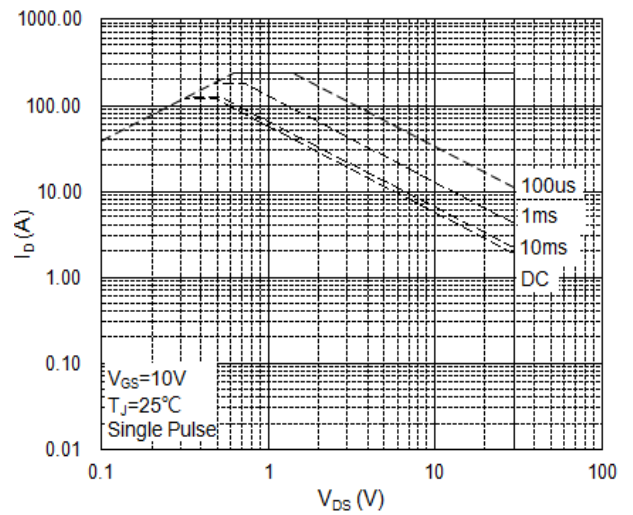


Fig.10: Safe Operating Area

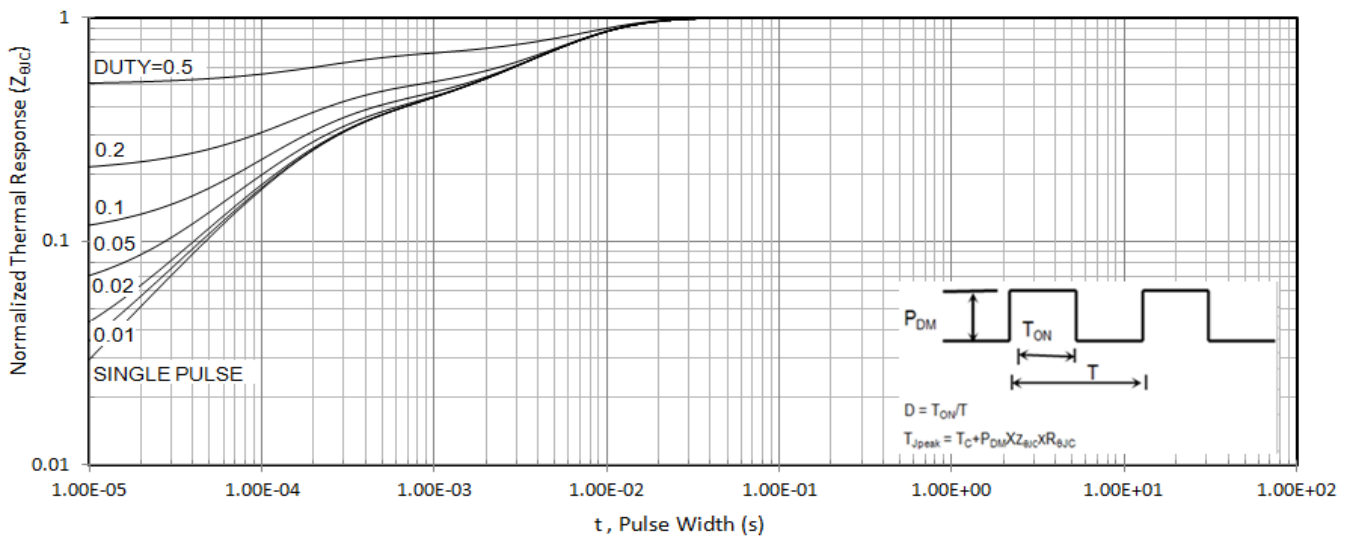


Fig.11: Transient Thermal Impedance

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