30V N-Channel MOS

Description

The NP60N03QR uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge.

General Features

- V_{DS} =30V，I_D =60A
  $R_{DS(ON)}$(Typ.)=4 mΩ @V_{GS}=10V
  $R_{DS(ON)}$(Typ.)=6.3 mΩ @V_{GS}=4.5V
  High power and current handing capability
- Lead free product is acquired
- Surface mount package

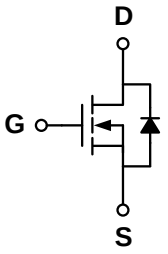
Application

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

Package

- DFN3×3-8L

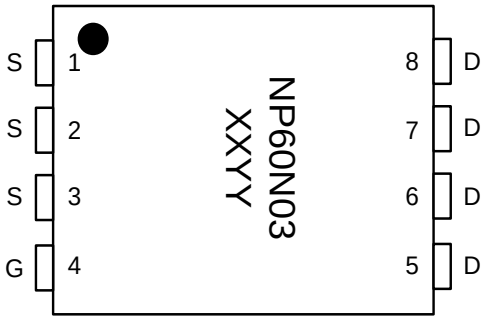
Schematic diagram



Marking and pin assignment

DFN3×3-8L

（Top View）



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP60N03QR-G	-55°C to +150°C	DFN3×3-8L	5000

Absolute Maximum Ratings (TA=25℃ unless otherwise noted)

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	30	V
Gate-source voltage		V_{GS}	±20	V
Continuous Drain Current	TC=25°C	I_D	60	A
	TC=100°C		45	
Pulsed Drain Current		I_{DP}	180	A
Avalanche Current		IAS	48	A
Avalanche energy(L=0.5mH)		EAS	120	mJ
Maximum power dissipation	TC=25°C	P_D	28	W
Power Dissipation – Derate above 25℃	TC=25°C		1.67	
Operating junction Temperature range		Tj	-55—150	℃

Electrical Characteristics (TA=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	30	-	-	V
BVDSS Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	Reference to 25℃,ID=1mA	-	27	-	mV/℃
Zero gate voltage drain current	I_{DSS}	V_{DS}=30V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
Gate Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.0	1.6	2.5	V
Drain-source on-state resistance[1]	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	4	4.5	mΩ
		V_{GS}=4.5V, I_D=20A	-	6.3	8	
On Status Drain Current	$I_{D(ON)}$	V_{DS}=10V, V_{GS}=10V	40	-	-	A
Diode Characteristics						
Diode Forward Voltage[1]	V_{SD}	I_{SD}=1A,V_{GS}=0V	-	0.8	1.1	V
Diode Continuous Forward Current	I_S		-	-	60	A
Reverse Recovery Time	t_{rr}	I_F=30A, dI/dt=100A/us	-	9.2	-	ns
Reverse Recovery Charge	Q_{rr}		-	2	-	nC
Dynamic Characteristics[2]						
Gate Resistance	R_G	V_{GS}=0V, V_{DS}=0V,f=1MHz	-	1.7	-	Ω
Input capacitance	C_{ISS}	V_{GS}=0V ,V_{DS}=20V f=1.0MHz	-	2161	-	pF
Output capacitance	C_{OSS}		-	308	-	
Reverse transfer capacitance	C_{RSS}		-	261	-	
Turn-on delay time	$t_{D(ON)}$	V_{GS}=10V, V_{DS}=15V, R_L=20Ω, I_D=20A, R_G=3.3Ω	-	4.6	-	ns
Turn-on Rise time	tr		-	12.2	-	
Turn-off delay time	$t_{D(OFF)}$		-	26.6	-	
Turn-off Fall time	tf		-	8	-	
Total gate charge	Q_g	V_{GS}=4.5V,I_D=20A V_{DS}=15V	-	42.3	-	nC
Gate-source charge	Q_{gs}		-	6.7	-	
Gate-drain charge	Q_{gd}		-	8.6	-	
Drain-Source Diode Characteristics						
Diode forward voltage	V_{SD}	I_{SD}=1A,V_{GS}=0V	-	0.8	1.1	V

Note: 1：Pulse test; pulse width ≦ 300ns, duty cycle ≦ 2%.

2：Guaranteed by design, not subject to production testing.

Thermal Characteristics

Parameter	Symbol	Typical	Unit
Thermal Resistance-Junction to Case	Rθjc	1.7	℃/W
Thermal Resistance junction-to ambient	Rθja	62.5	

Typical Performance Characteristics

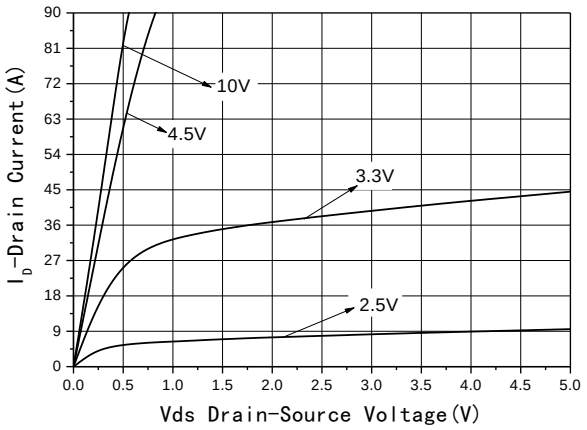


Fig1 Output Characteristics

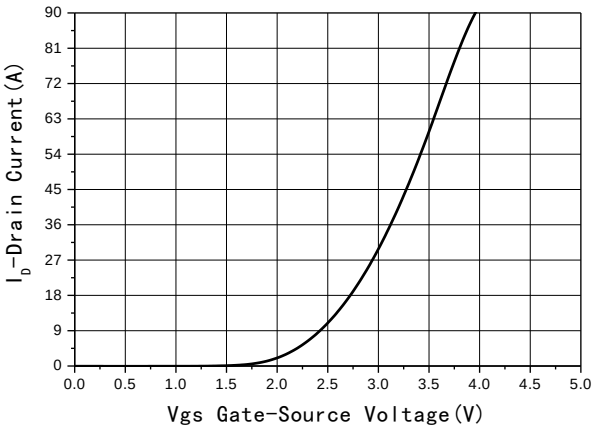


Fig2 Transfer Characteristics

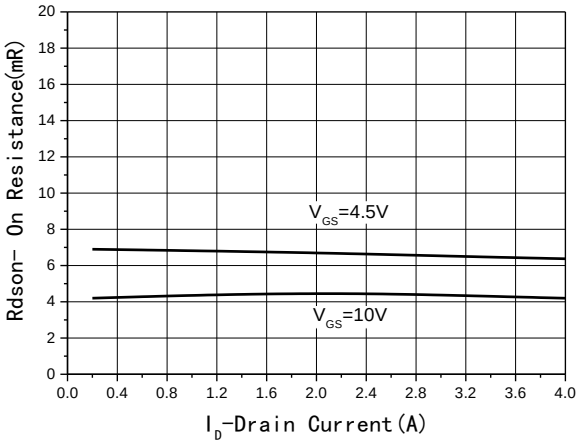


Fig3 Rdson-Drain current

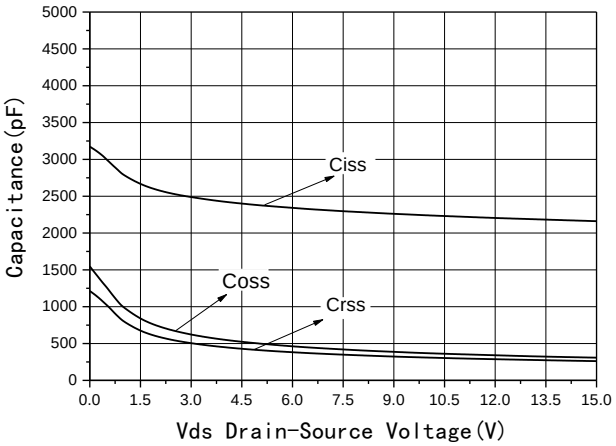


Fig4 Capacitance vs Vds

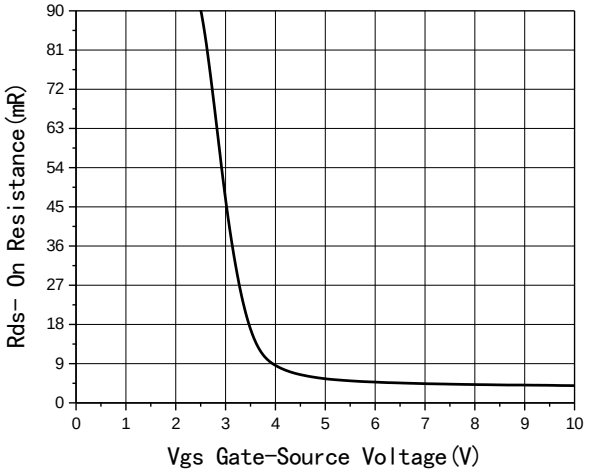


Fig5 Rdson-Gate Drain voltage

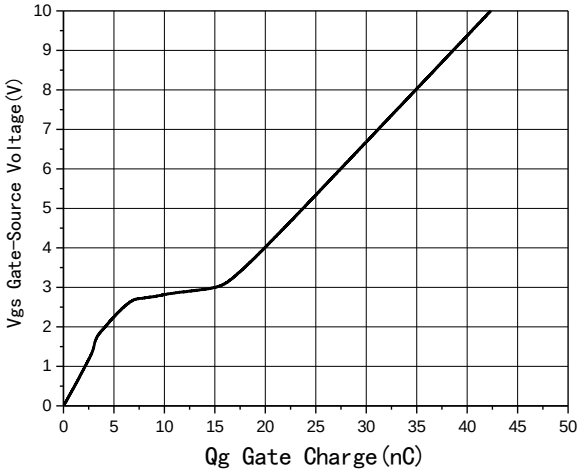


Fig6 Gate Charge

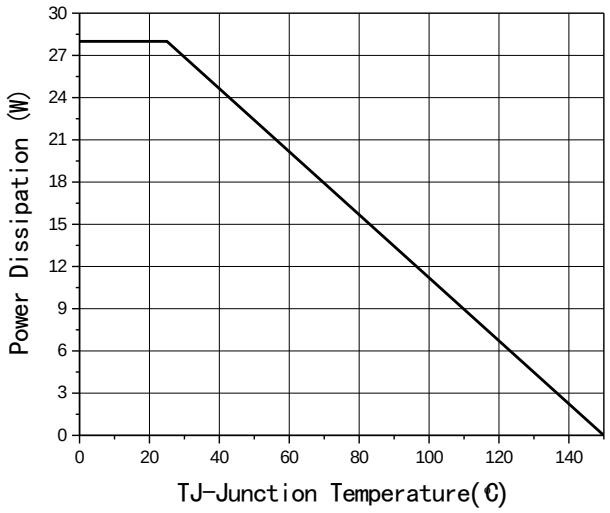


Fig7 Power De-rating

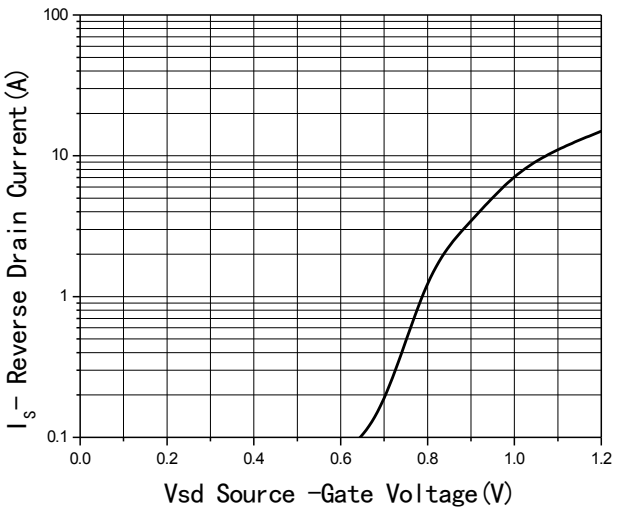
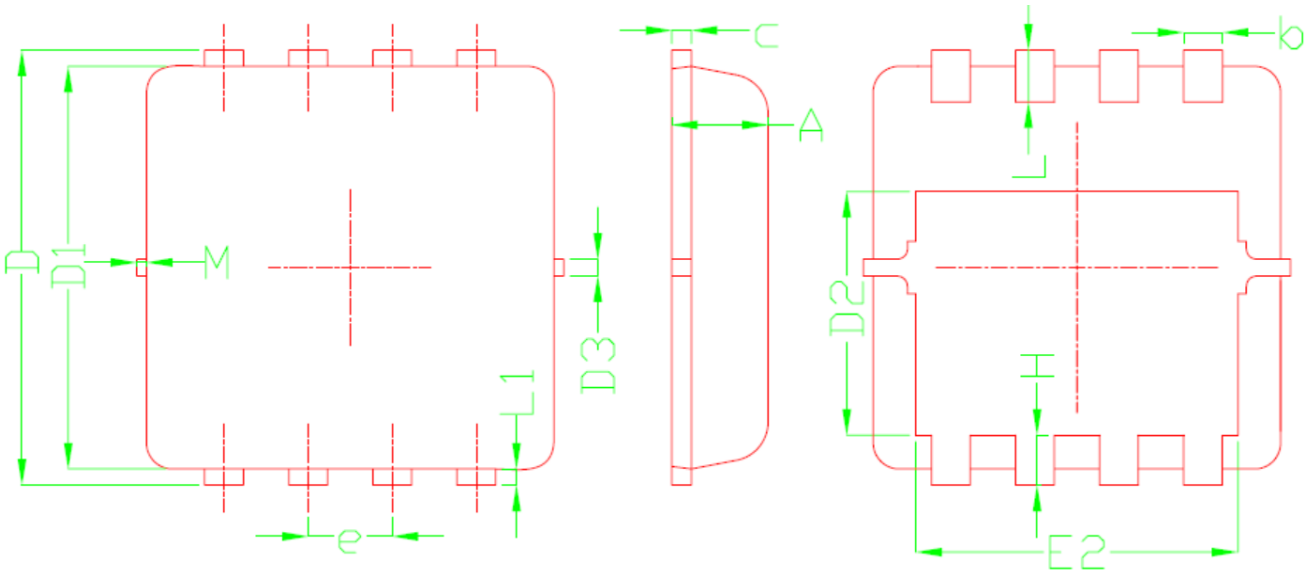
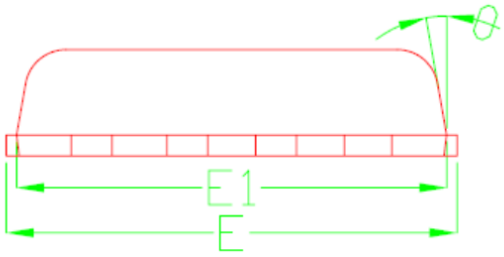


Fig8 Source-Drain Diode Forward

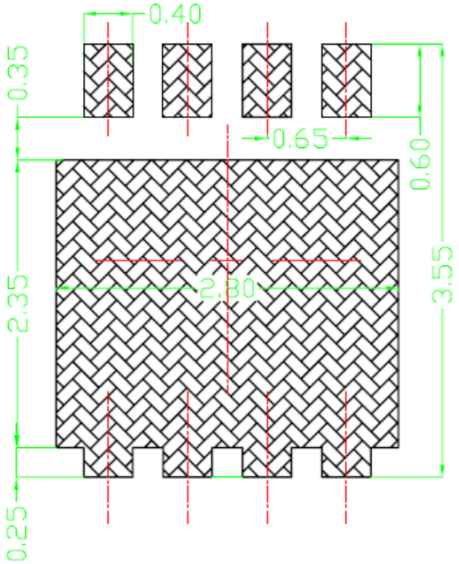
Package Information

- **DFN3×3-8L**





Land Pattern
(Only for Reference)



SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.78	1.88	1.98
D3	---	0.13	---
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	---	0.13	---
θ	---	10°	12°
M	*	*	0.15
* Not specified			