

30V N-Channel MOS

Description

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

General Features

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

Application

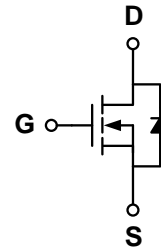
- ◆ High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- ◆ Networking DC-DC Power System
- ◆ Load switch

Package

- ◆ DFN3×3-8L



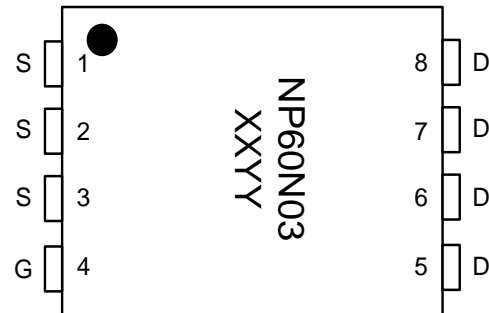
Schematic diagram



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°C unless otherwise noted)

parameter	symbol	limit	unit
Drain-source voltage	V_{DS}	30	V
Gate-source voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	TC=25°C	60
		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	P_D	TC=25°C	28
Power Dissipation – Derate above 25°C		TC=25°C	1.67
Operating junction Temperature range	T_j	-55—150	°C

Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
BVDSS Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to 25°C, $I_D=1mA$	-	27	-	mV/°C
Zero gate voltage drain current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
		$T_J=85^\circ C$	-	-	30	
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	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}	$I_F=30A,$	-	9.2	-	ns
Reverse Recovery Charge	Q_{rr}	$dI/dt=100A/us$	-	2	-	nC
Dynamic Characteristics²						
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	$t_{D(ON)}$	$V_{GS}=10V, V_{DS}=15V,$ $R_L=20\Omega, I_D=20A, R_G=3.3\Omega$	-	4.6	-	ns
Turn-on Rise time	t_r		-	12.2	-	
Turn-off delay time	$t_{D(OFF)}$		-	26.6	-	
Turn-off Fall time	t_f		-	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 $\leq 300ns$, duty cycle $\leq 2\%$.

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

Thermal Characteristics

Parameter	Symbol	Typical	Unit
Thermal Resistance-Junction to Case	$R_{\theta jc}$	1.7	°C/W
Thermal Resistance junction-to ambient	$R_{\theta ja}$	62.5	

Typical Performance Characteristics

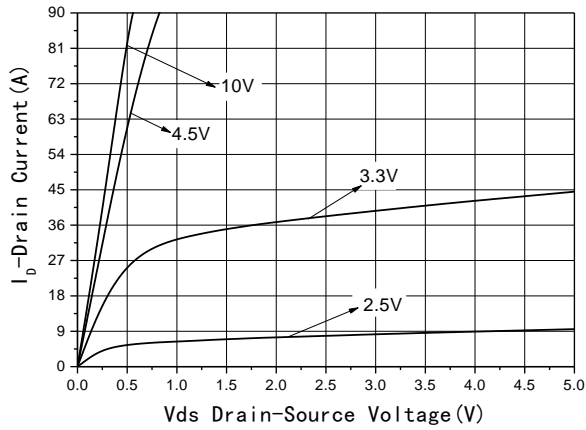


Fig1 Output Characteristics

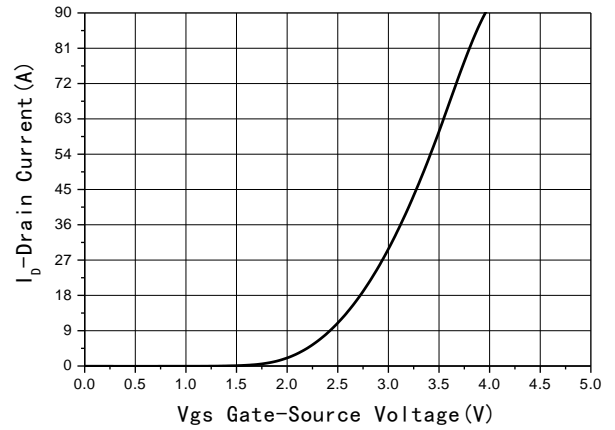


Fig2 Transfer Characteristics

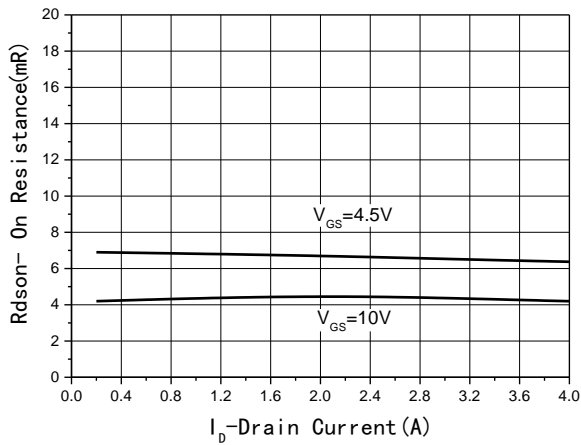


Fig3 $R_{DS(on)}$ -Drain current

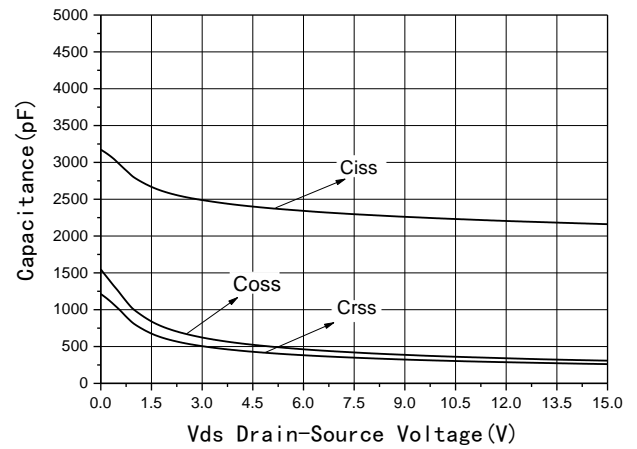


Fig4 Capacitance vs V_{DS}

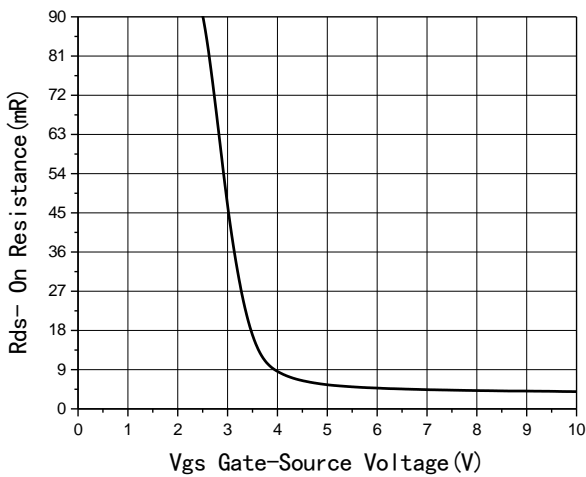


Fig5 $R_{DS(on)}$ -Gate Drain voltage

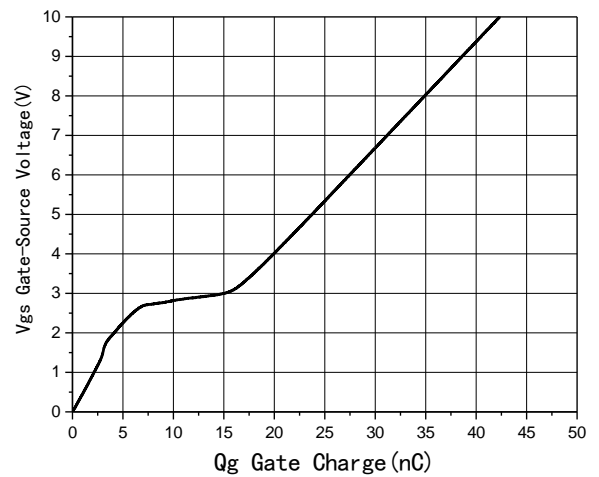


Fig6 Gate Charge

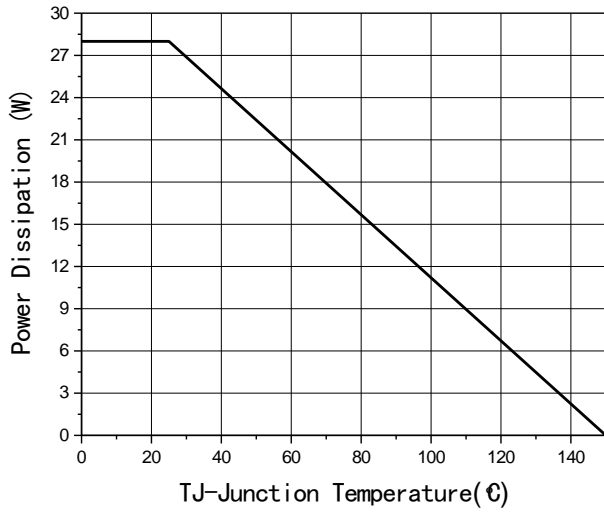


Fig7 Power De-rating

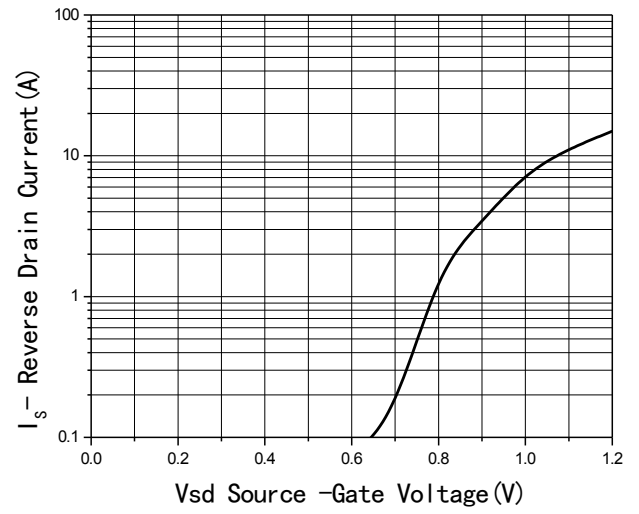
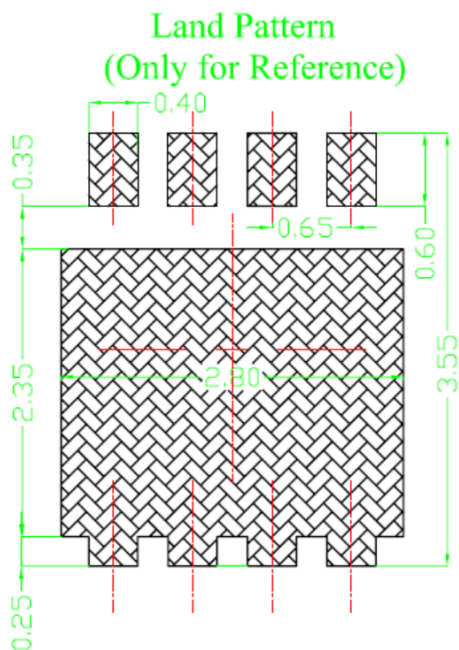
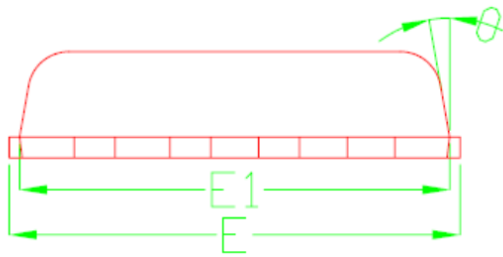
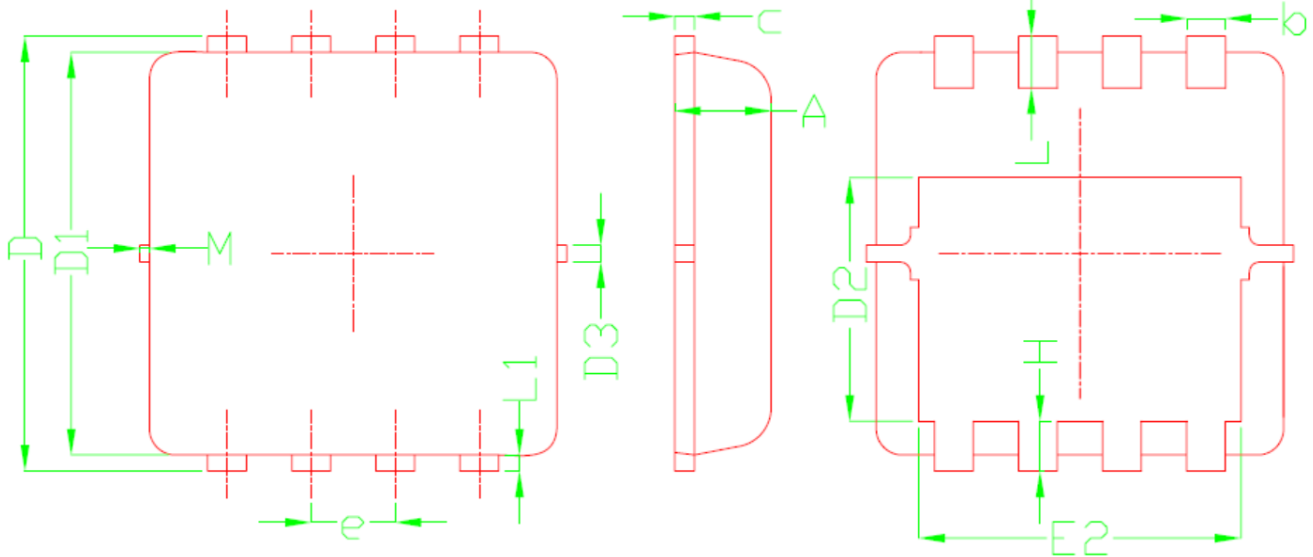


Fig8 Source-Drain Diode Forward

Package Information

- DFN3×3-8L



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			

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