40V N And P-Channel Enhancement Mode MOSFET

Description

The NP4614G-N uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge . The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

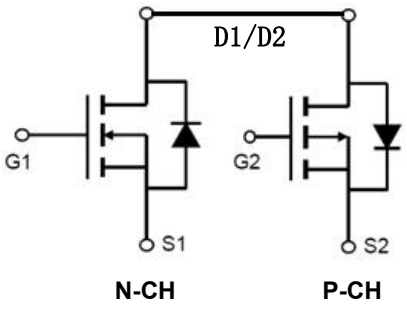
General Features

- **N-channel：**
  V_{DS} =40V，ID =16A
  $R_{DS(ON)}$=11mΩ (typical) @ VGS=10V
  $R_{DS(ON)}$=14mΩ (typical) @ VGS=4.5V
  P-Channel：
  V_{DS} =-40V，ID =-16A
  $R_{DS(ON)}$=35mΩ (typical) @ VGS=-10V
  $R_{DS(ON)}$=46mΩ (typical) @ VGS=-4.5V
- Excellent gate charge x $R_{DS(ON)}$ product(FOM)
- Very low on-resistance $R_{DS(ON)}$
- 150 °C operating temperature
- Pb-free lead plating
- 100% UIS tested

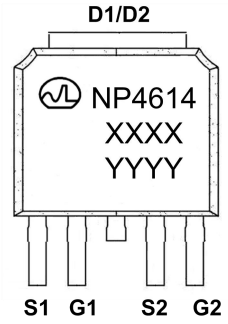
Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

Schematic diagram



Marking and pin assignment



XXXX—Wafer Information

YYYY—Quality Code

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP4614G-N-G	-55°C to +150°C	TO252-4L	2500

N-Channel Absolute Maximum Ratings (TC=25℃ unless otherwise noted)

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	40	V
Gate-source voltage		V_{GS}	±20	V
Continuous Drain Current	25°C	I_D	16	A
	100°C		12	
Plused Drain Current		I_{DM}	56	A

Avalanche energy[A]		E_{AS}	25	mJ
Power Dissipation[B]	25°C	P_D	40	W
	100°C		16	
Operating junction Temperature range		Tj	-55—150	℃

N-Channel Electrical Characteristics (T_J=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	40	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=40V, V_{GS}=0V	-	-	1	μA
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	1.6	2	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=10A	-	11	16	mΩ
		V_{GS}=10V, I_D=10A	-	14	24	
Forward Transconductance	g_{FS}	V_{DS}=20V,I_D=10A	-	15	-	S
Diode Characteristics						
Diode Forward Voltage	V_{SD}	I_{SD}= 2A,V_{GS}=0V	-	0.7	1	V
Diode Continuous Forward Current	I_S		-	-	16	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = I_S, di/dt = 100A/μs	-	8.5	-	ns
Reverse Recovery Charge	Q_{rr}		-	8	-	nC
Dynamic Characteristics						
Gate Resistance	R_G	V_{GS}=0V, V_{DS}=0V,f=1MHz	-	-	3.5	Ω
Input capacitance	C_{ISS}	V_{GS}=0V ,V_{DS}=20V f=1.0MHz	-	1015	-	pF
Output capacitance	C_{OSS}		-	100	-	
Reverse transfer capacitance	C_{RSS}		-	15	-	
Turn-on delay time	$t_{D(ON)}$	V_{GS}=10V, V_{DS}=20V, R_L=1.5Ω, R_G=3Ω	-	4	-	ns
Turn-on Rise time	tr		-	11.5	-	
Turn-off delay time	$t_{D(OFF)}$		-	18	-	
Turn-off Fall time	t_f		-	5.6	-	
Total gate charge	Q_g	V_{GS}=10V, V_{DS}=20V， I_D=10A	-	22.7	-	nC
Gate-source charge	Q_{gs}		-	3.3	-	
Gate-drain charge	Q_{gd}		-	4	-	

Typical Performance Characteristics

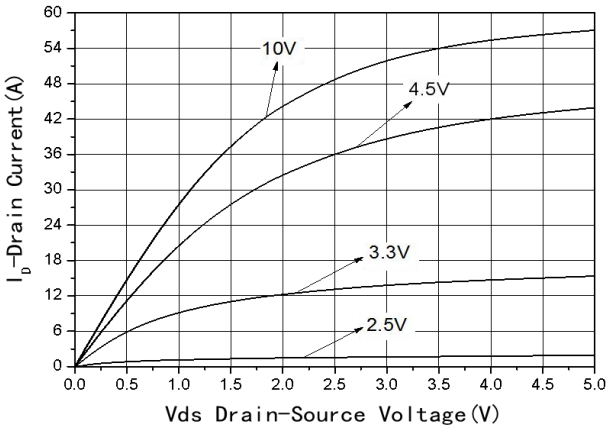


Fig1 Output Characteristics

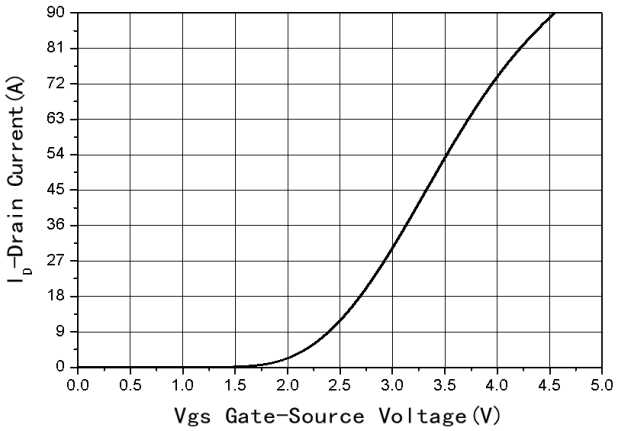


Fig2 Transfer Characteristics

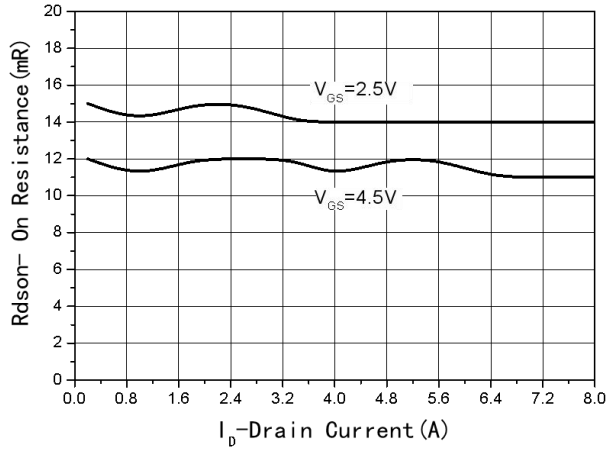


Fig3 Rdson-Drain current

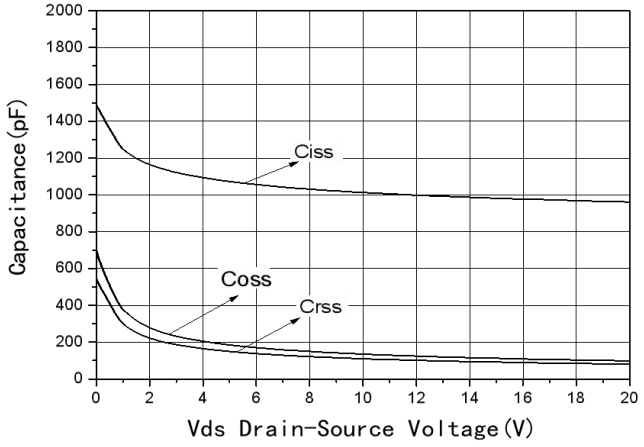


Fig4 Capacitance vs Vds

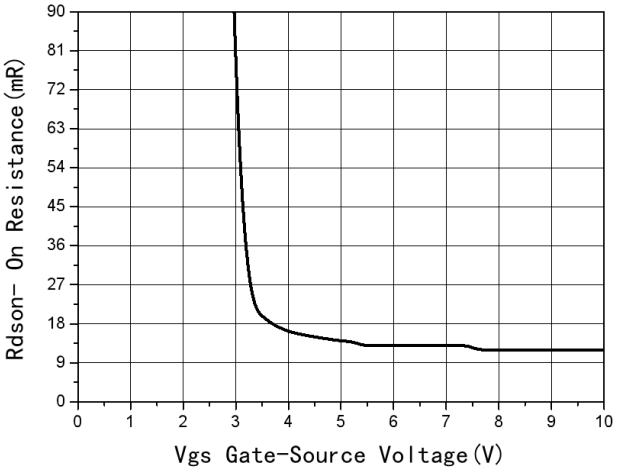


Fig5 Rdson-Gate Drain voltage

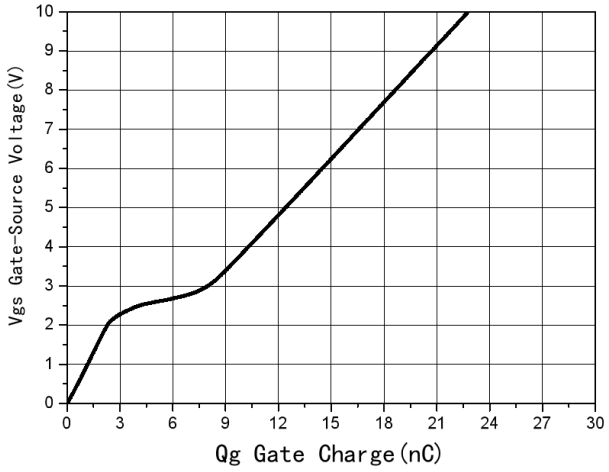


Fig6 Gate Charge

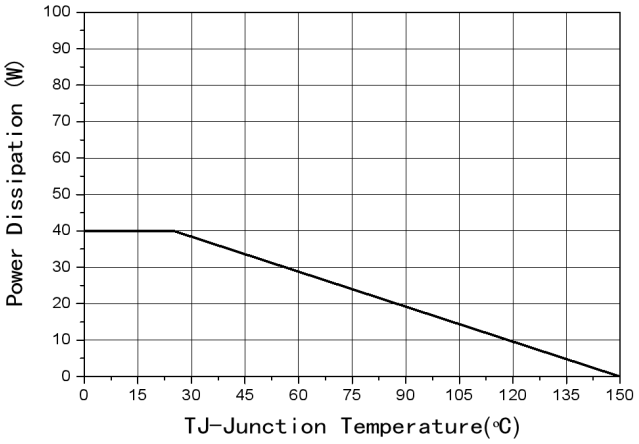


Fig7 Power De-rating

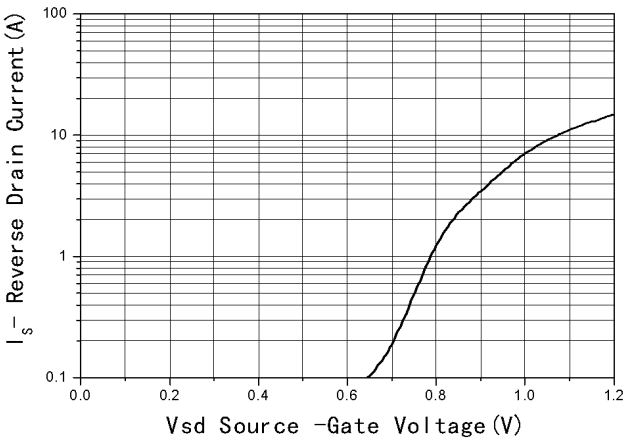


Fig8 Source-Drain Diode Forward

P-Channel Absolute Maximum Ratings (TC=25℃ unless otherwise noted)

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	-40	V
Gate-source voltage		V_{GS}	±20	V
Continuous Drain Current	25°C	I_D	-16	A
	100°C		-12	
Plused Drain Current		I_{DM}	-56	A
Avalanche energy[A]		E_{AS}	25	mJ
Power Dissipation[B]	25°C	P_D	40	W
	100°C		16	
Operating junction Temperature range		Tj	-55—150	℃

P-Channel Electrical Characteristics (T_J=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	-40	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=-40V, V_{GS}=0V	-	-	-1	μA
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	-1.6	-2	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-10A	-	35	40	mΩ
		V_{GS}=-10V, I_D=-10A	-	46	50	
Forward Transconductance	g_{FS}	V_{DS}=-20V,I_D=-10A	-	15	-	S
Diode Characteristics						
Diode Forward Voltage	V_{SD}	I_{SD}=-2A,V_{GS}=0V	-	-0.7	-1	V
Diode Continuous Forward Current	I_S		-	-	-16	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = I_S, di/dt = -100A/μs	-	17	-	ns
Reverse Recovery Charge	Q_{rr}		-	7	-	nC
Dynamic Characteristics						
Gate Resistance	R_G	V_{GS}=0V, V_{DS}=0V,f=1MHz	-	-	3.5	Ω
Input capacitance	C_{ISS}	V_{GS}=0V ,V_{DS}=-20V f=1.0MHz	-	969	-	pF
Output capacitance	C_{OSS}		-	83	-	
Reverse transfer capacitance	C_{RSS}		-	73	-	
Turn-on delay time	$t_{D(ON)}$	V_{GS}=-10V, V_{DS}=-20V, R_L=1.5Ω, R_G=3Ω	-	10	-	ns
Turn-on Rise time	tr		-	15	-	
Turn-off delay time	$t_{D(OFF)}$		-	30	-	
Turn-off Fall time	t_f		-	18	-	
Total gate charge	Q_g	V_{GS}=-10V, V_{DS}=-20V， I_D=-10A	-	20	-	nC
Gate-source charge	Q_{gs}		-	3.8	-	
Gate-drain charge	Q_{gd}		-	3.4	-	

Thermal Characteristics

Thermal Resistance,Junctuion-to-Case[B]	$R_{\theta JC}$	3.1	℃/W

A. E_{AS} Condition: (T_j=25℃ ,V_{DD}=±40V,V_G=±10V,L=0.5mH,Rg=25Ω)

B. The power dissipation P_D is based on $T_{J(MAX)}$=150° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Surface Mounted on FR4 Board, t ≤ 10 sec.

Typical Performance Characteristics

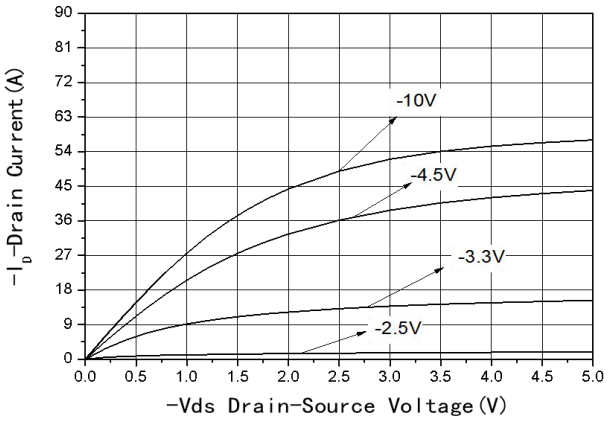


Fig1 Output Characteristics

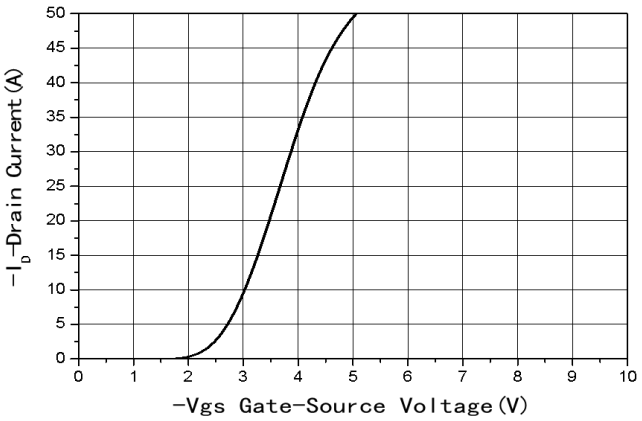


Fig2 Transfer Characteristics

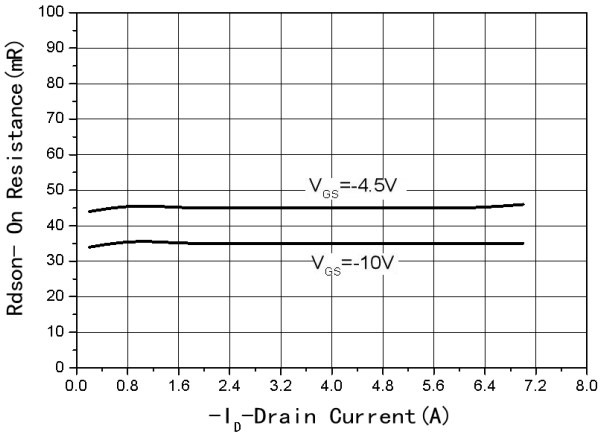


Fig3 Rdson-Drain current

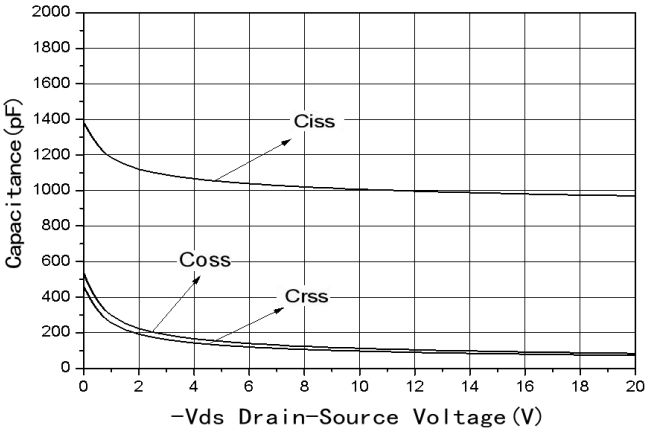


Fig4 Capacitance vs Vds

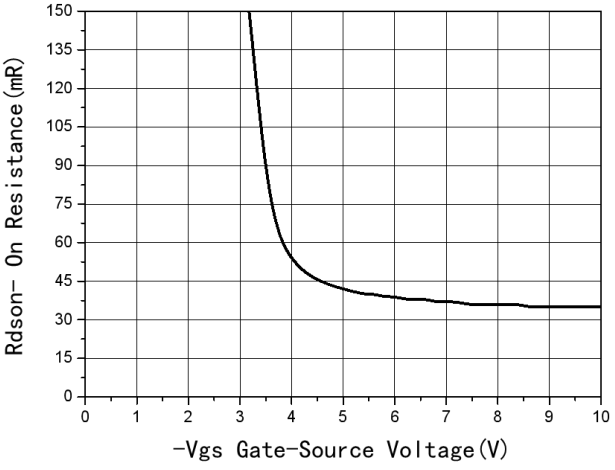


Fig5 Rdson-Gate Drain voltage

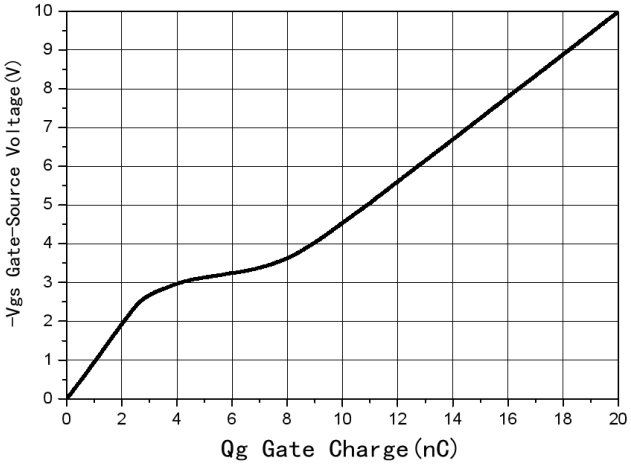


Fig6 Gate Charge

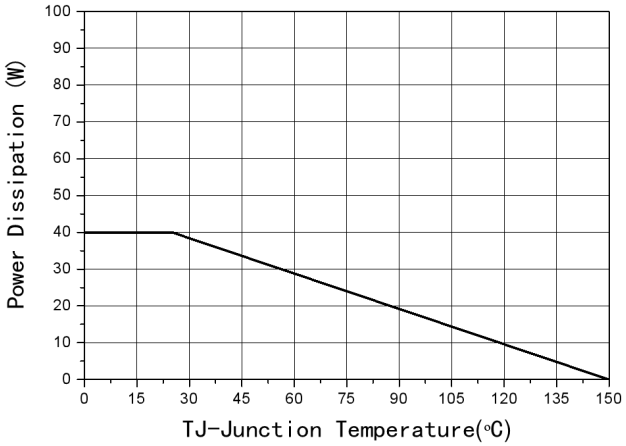


Fig7 Power De-rating

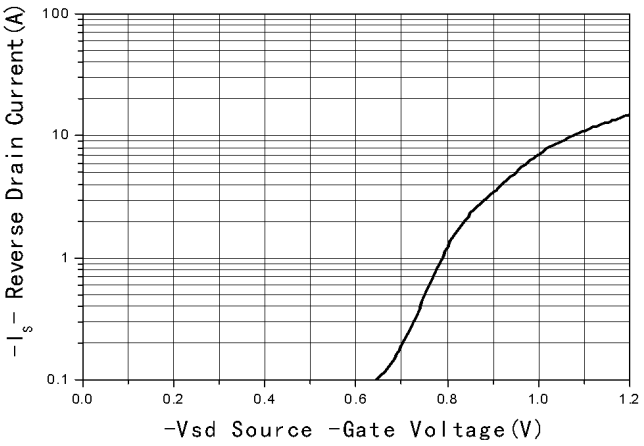


Fig8 Source-Drain Diode Forward

Package Information

- **TO252-4L**