N And P-Channel Enhancement Mode MOSFET

Description

The NP6608D6 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.

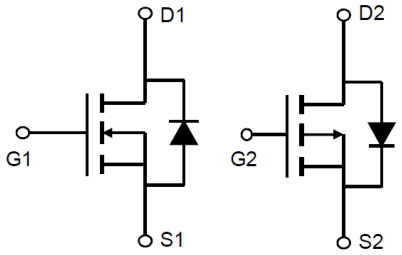
General Features

- **N-channel：**
  V_{DS} =20V，ID =8A
  $R_{DS(ON)}$=9.5mΩ (typical) @ VGS=4.5V
  $R_{DS(ON)}$=13mΩ (typical) @ VGS=2.5V
  P-Channel：
  V_{DS} =-20V，ID =-8A
  $R_{DS(ON)}$=14mΩ (typical) @ VGS=-4.5V
  $R_{DS(ON)}$=18mΩ (typical) @ VGS=-2.5V
- 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

- Pch+Nch Complementary MOSFET for DC-FAN
- H-Bridge application

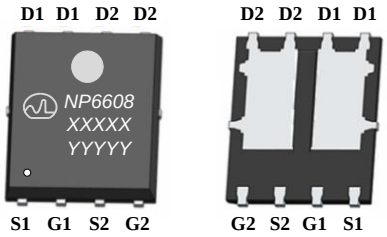
Schematic diagram



N-CH P-CH

Marking and pin assignment

PDFN5×6-8L-B



XXXX—Wafer Information

YYYY—Quality Code

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP6608D6-G	-55°C to +150°C	PDFN5*6-8L-B	5000

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

Parameter		Symbol	Limit		Unit
			N	P	
Drain-source voltage		V_{DS}	20	-20	V
Gate-source voltage		V_{GS}	±12	±12	V
Operating junction Temperature range		T_j	-55—150	-55—150	℃
Drain Current-Continuous (Silicon Limited)	T_A=25°C	I_D	8	-8	A
	T_A=75°C		-5	-5	

Pulsed Drain Current (Package Limited)		I_{DM}	35	-35	A
Avalanche Current C		I_{AS}, I_{AR}	22	-27	A
Avalanche energy L=0.1mH C		E_{AS}, E_{AR}	24	36	mJ
Power Dissipation B	T_A=25°C	P_D	12	20	W
	T_A=75°C		5	8	
Junction and Storage Temperature Range		T_J, T_{STG}	-55—150		℃

N-Channel Electrical Characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	20	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=20V, V_{GS}=0V	-	-	1	μA
Gate-body leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±12V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	0.45	0.7	1.5	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=8A	-	9.5	13.5	mΩ
		V_{GS}=2.5V, I_D=8A	-	13	16	
Forward transconductance	gfs	V_{DS}=5V, I_D=16A	-	43	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=10V ,V_{GS}=0V f=1.0MHz	-	1007	-	pF
Output capacitance	C_{OSS}		-	136	-	
Reverse transfer capacitance	C_{RSS}		-	117	-	
Gate resistance	Rg	V_{GS}=0V, V_{DS}=0V, f=1.0MHz	-	1.6	2.4	Ω
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DS}=10V V_{GS}=5V R_L=1.5Ω R_{GEN}=3Ω	-	4.4	-	ns
Rise time	tr		-	9	-	
Turn-off delay time	$t_{D(OFF)}$		-	17	-	
Fall time	tf		-	6	-	
Total gate charge	Qg	V_{DS}=10V,I_D=8A V_{GS}=5V	-	13.2	-	nC
Gate-source charge	Qgs		-	1.3	-	
Gate-drain charge	Qgd		-	4	-	

Typical Performance Characteristics

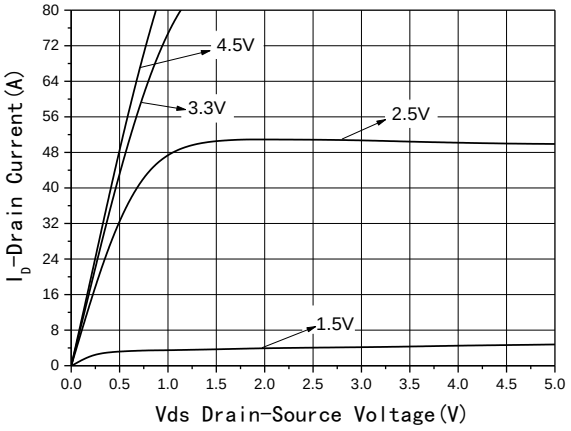


Fig1 Output Characteristics

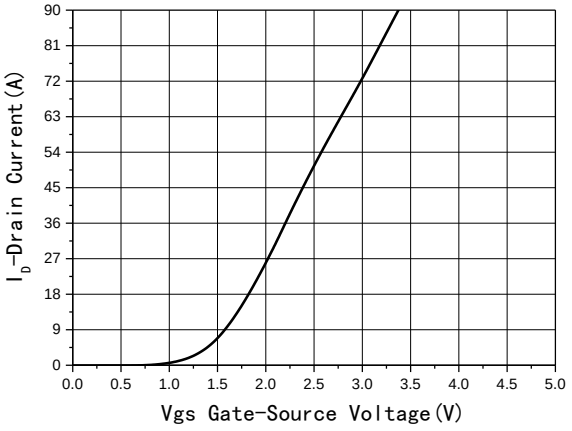


Fig2 Transfer Characteristics

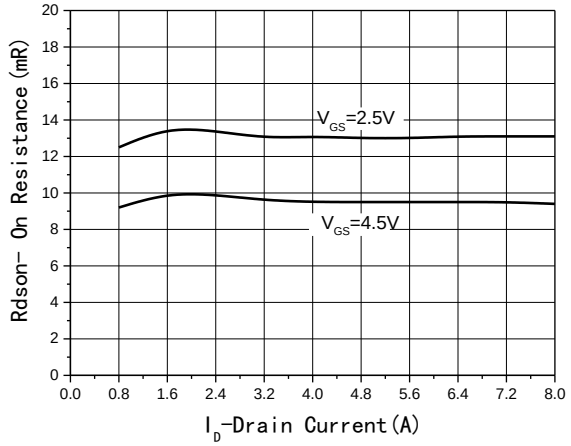


Fig3 Rdson-Drain current

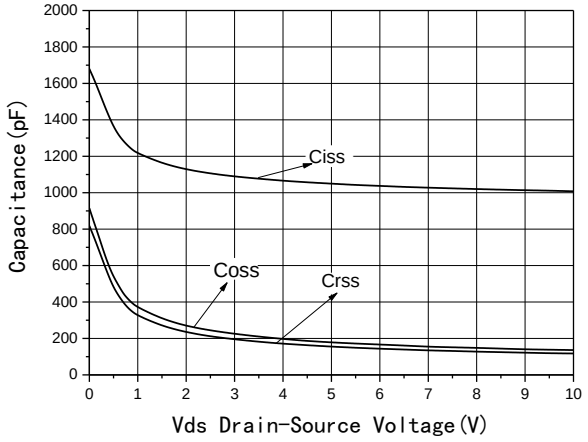


Fig4 Capacitance vs Vds

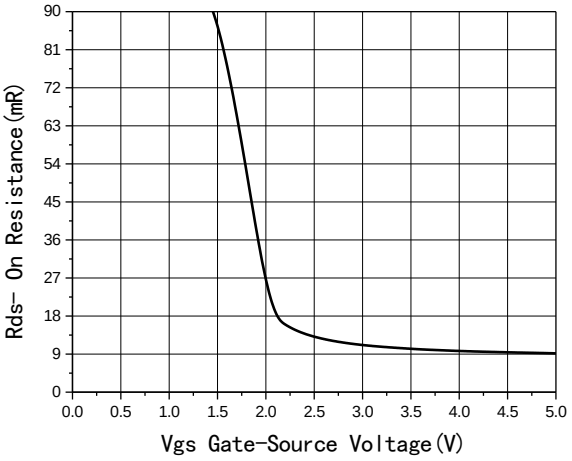


Fig5 Rdson-Gate Drain voltage

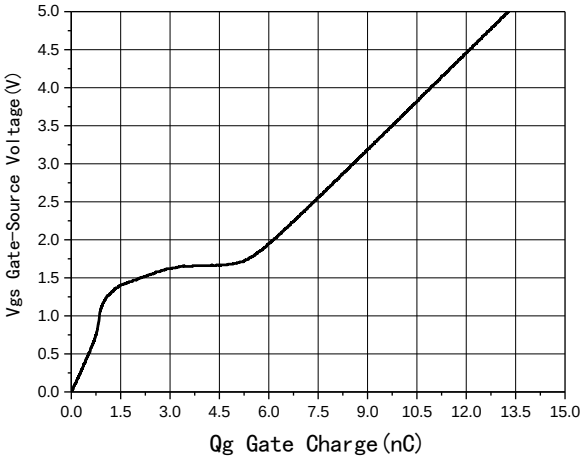


Fig6 Gate Charge

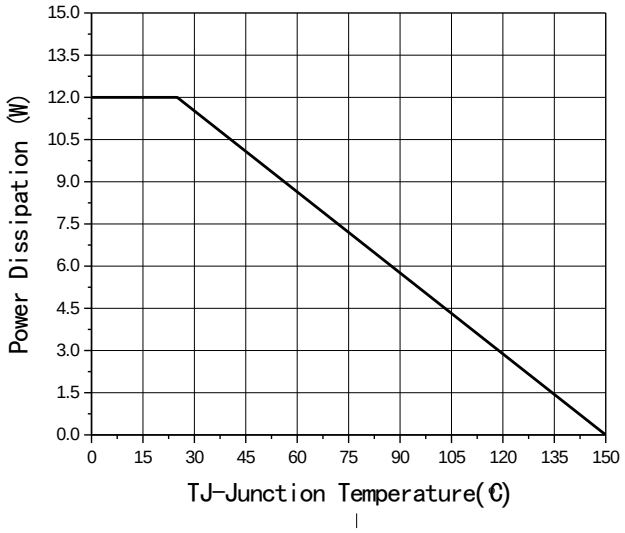


Fig7 Power De-rating

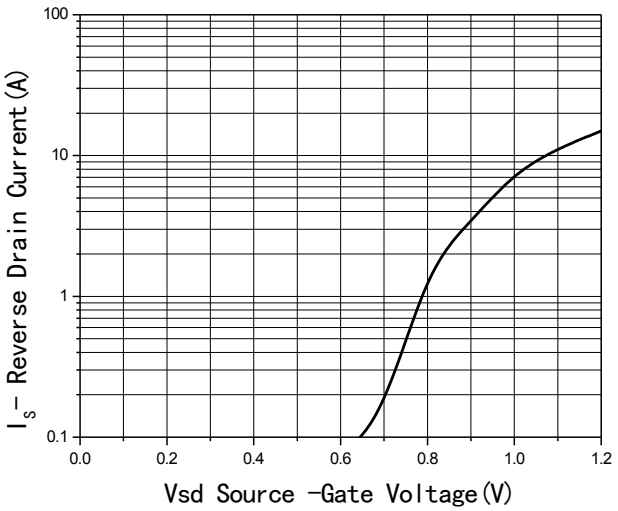


Fig8 Source-Drain Diode Forward

P-Channel Electrical Characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=-250μA	-20	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=-20V, V_{GS}=0V	-	-	-1	μA
Gate-body leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±12V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.45	-0.65	-1.00	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-8A	-	14	26	mΩ
		V_{GS}=-2.5V, I_D=-8A	-	18	29	
Forward transconductance	gfs	V_{DS}=-5V, I_D=-8A	-		-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=-10V ,V_{GS}=0V f=1.0MHz	-	1433	-	pF
Output capacitance	C_{OSS}		-	161	-	
Reverse transfer capacitance	C_{RSS}		-	139	-	
Gate resistance	Rg	V_{GS}=0V, V_{DS}=0V, f=1.0MHz	-	4	-	Ω
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DS}=-10V V_{GS}=-5V R_L=2.3Ω R_{GEN}=3Ω	-	10	-	ns
Rise time	tr		-	5.5	-	
Turn-off delay time	$t_{D(OFF)}$		-	3.6	-	
Fall time	tf		-	4.6	-	
Total gate charge	Qg	V_{DS}=-10V,I_D=-8A V_{GS}=-5V	-	17	-	nC
Gate-source charge	Qgs		-	1.8	-	
Gate-drain charge	Qgd		-	4.4	-	

Typical Performance Characteristics

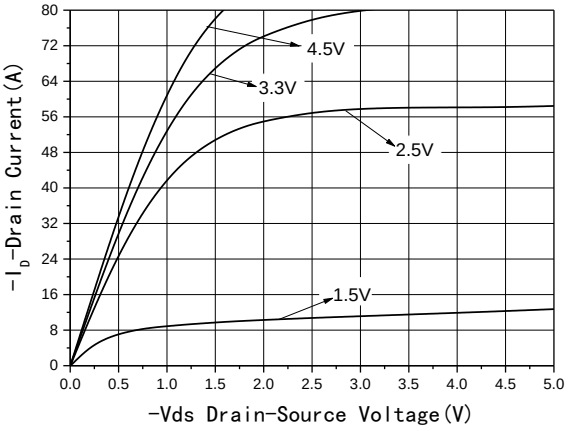


Fig1 Output Characteristics

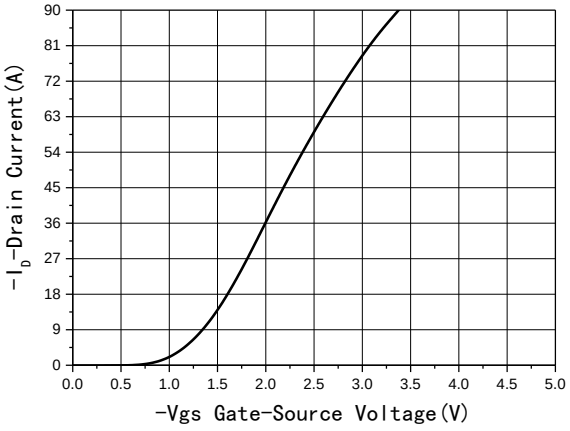


Fig2 Transfer Characteristics

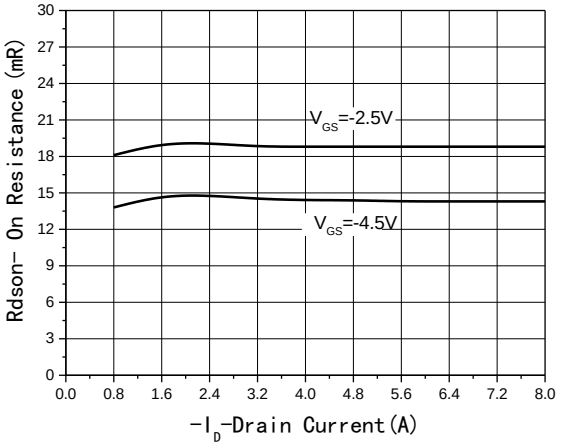


Fig3 Rdson-Drain current

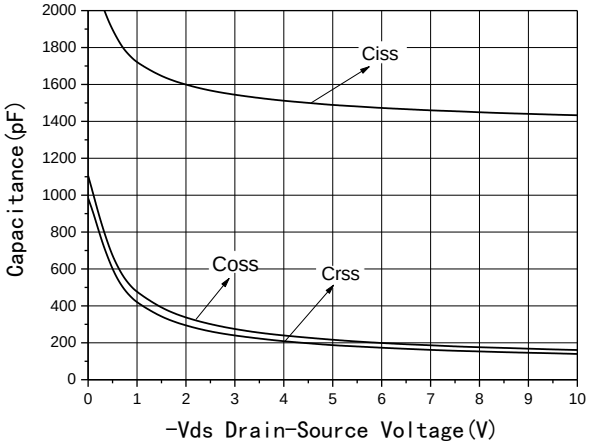


Fig4 Capacitance vs Vds

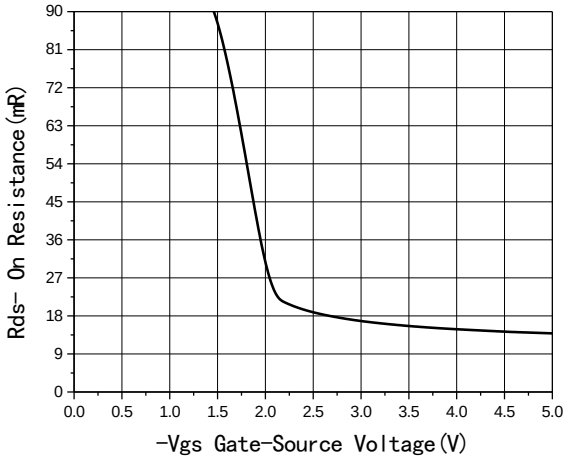


Fig5 Rdson-Gate Drain voltage

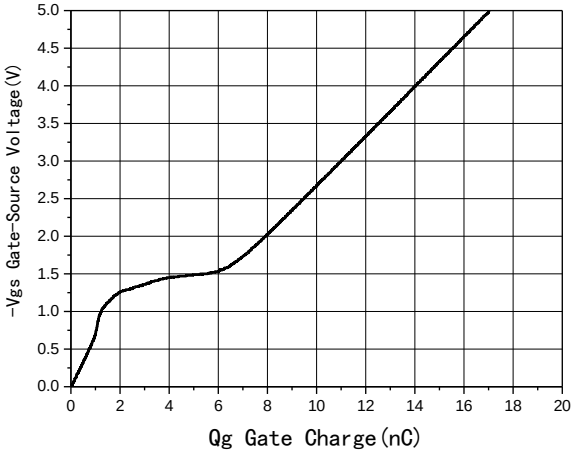


Fig6 Gate Charge

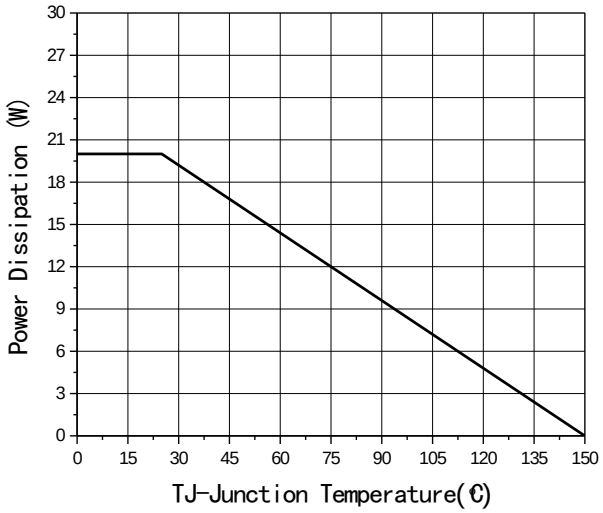


Fig7 Power De-rating

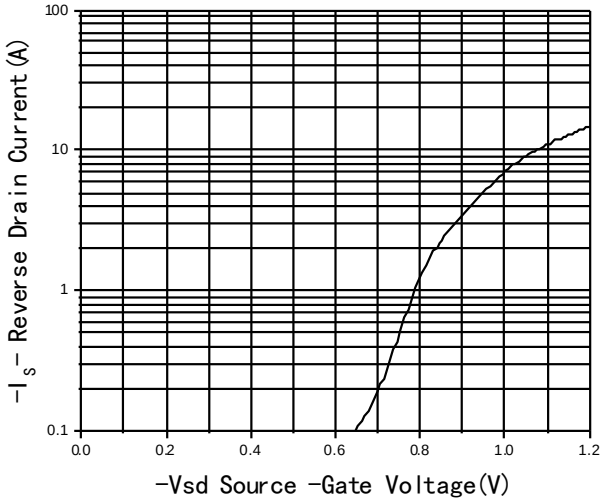
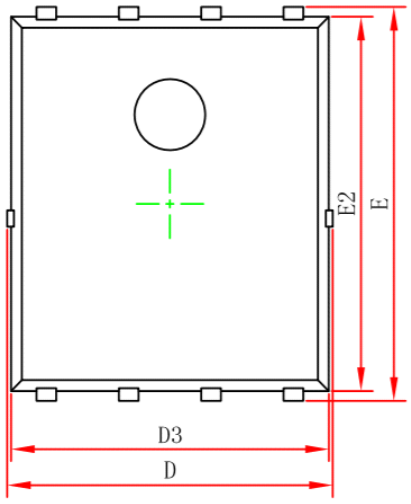


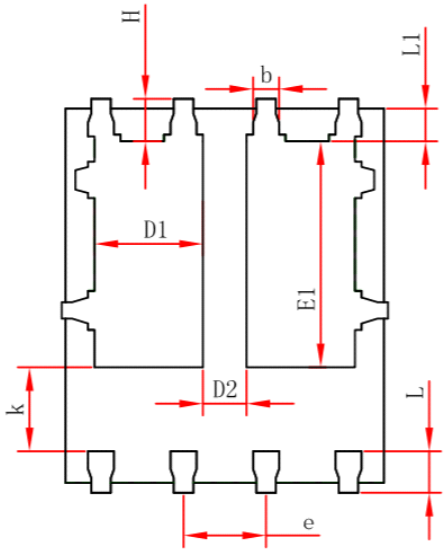
Fig8 Source-Drain Diode Forward

Package Information

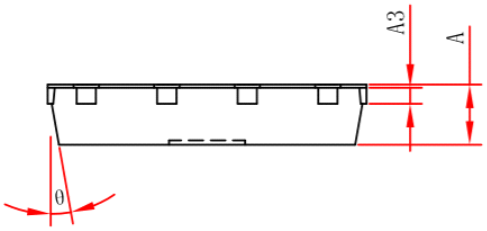
- **PDFN5*6-8L-B**



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.154REF.		0.006REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°