60V P-Channel Enhancement Mode MOSFET

Description

The NP3P06MR uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in load switch and battery protection applications.

General Features

- V_{DS} =-60V，I_D =-3A
  $R_{DS(ON)}$(Typ)=123.5mΩ @V_{GS}=-10V
  $R_{DS(ON)}$(Typ)=160mΩ @V_{GS}=-4.5V
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

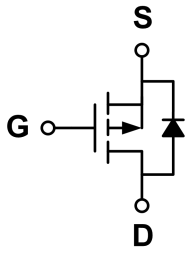
Application

- Battery protection
- Load switch

Package

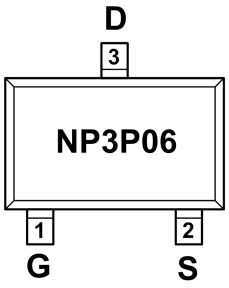
- SOT-23-3L

Schematic diagram



Marking and pin assignment

SOT-23-3L
(TOP VIEW)



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP3P06MR-G	-55°C to +150°C	SOT-23-3L	3000

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

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	-60	V
Gate-source voltage		V_{GS}	±20	V
Continuous Drain Current	T_A=25℃	I_D	-3	A
	T_A=70℃		-2	A
Pulsed Drain Current [C]		I_{DM}	-12	A
Maximum power dissipation [B]	T_A=25℃	P_D	1.4	W
	T_A=70℃		0.9	
Operating junction Temperature range		Tj	-55—150	℃

Electrical Characteristics (TA=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	-60	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=-60V, V_{GS}=0V	-	-	-1	μA
Gate-body leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-1.0	-1.7	-2.5	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=-3A	-	123.5	140	mΩ
		V_{GS}=4.5V, I_D=-3A		160	190	
Forward transconductance	gfs	V_{DS}=-5V, I_D=-3A	-	10	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=-30V ,V_{GS}=0V f=1.0MHz	-	495	-	pF
Output capacitance	C_{OSS}		-	30	-	
Reverse transfer capacitance	C_{RSS}		-	22	-	
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DS}=-30V R_L=7.5 Ω V_{GS}=-10V R_{GEN}=3Ω	-	8	-	ns
Rise time	tr		-	4	-	
Turn-off delay time	$t_{D(OFF)}$		-	32	-	
Fall time	tf		-	7	-	
Total gate charge	Qg	V_{DS}=-30V,I_D=-3A V_{GS}=-10V	-	9.4	-	nC
Gate-source charge	Qgs		-	1.9	-	
Gate-drain charge	Qgd		-	1.3	-	
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V_{SD}	V_{GS}=0V,Is=-1.0A	-	-0.8	-1.0	V

Thermal Characteristics

Parameter		Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient [A]	t≤ 10s	$R_{θJA}$	70	90	℃/W
Maximum Junction-to-Ambient [A]	Steady-State		100	125	
Maximum Junction-to-Lead	Steady-State	$R_{θJL}$	62	80	

A. The value of $R_{θJA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The value in any given application depends on the user's specific board design.

B. The power dissipation PD is based on $T_{J(MAX)}$=150°C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low frequency and duty

Typical Performance Characteristics

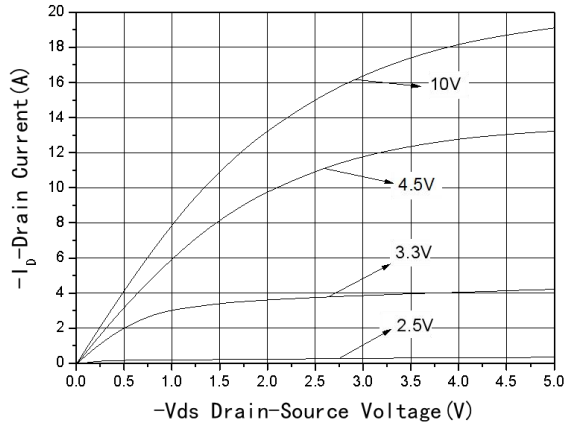


Fig1 Output Characteristics

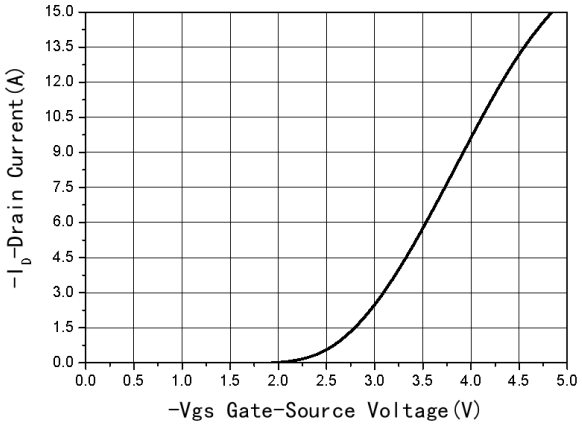


Fig2 Transfer Characteristics

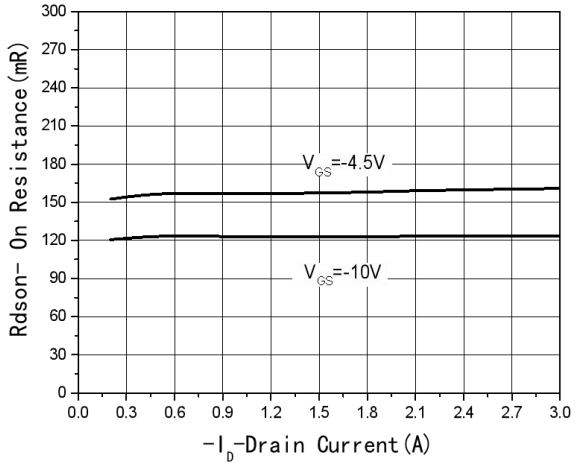


Fig3 Rdson-Drain current

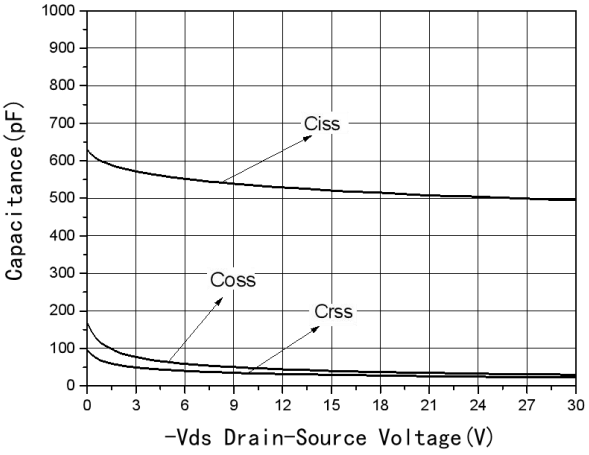


Fig4 Capacitance vs Vds

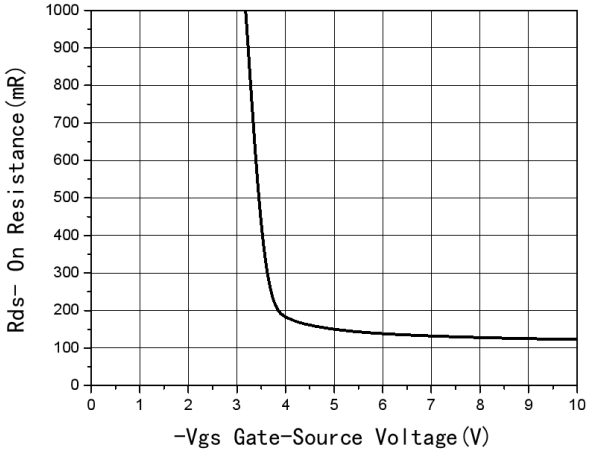


Fig5 Rdson-Gate Drain voltage

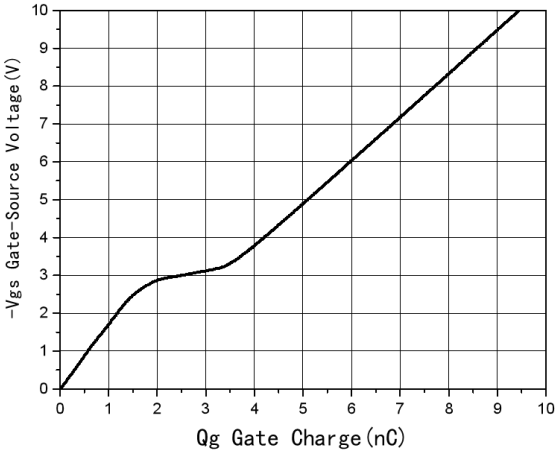


Fig6 Gate Charge

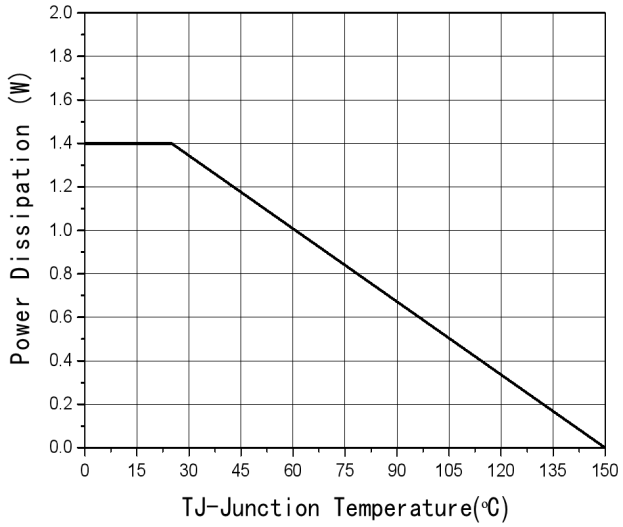


Fig7 Power De-rating

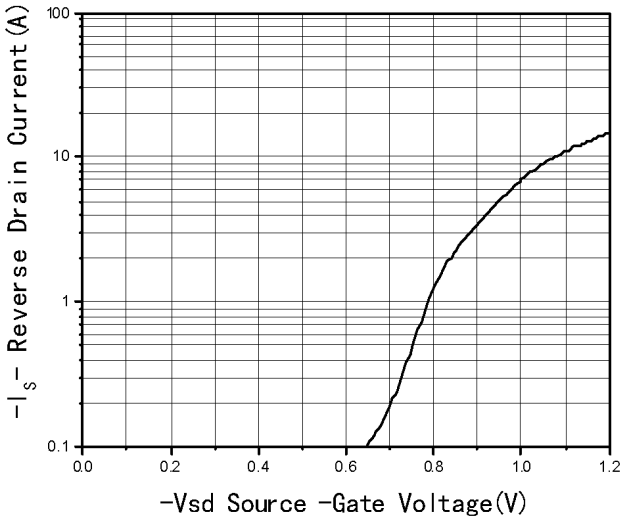
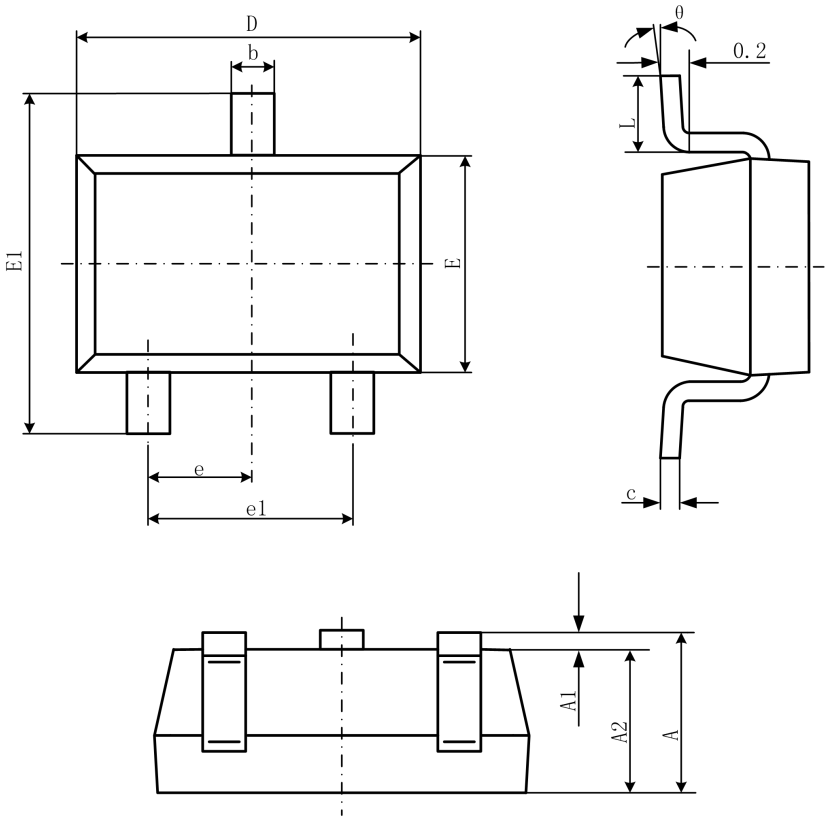


Fig8 Source-Drain Diode Forward

Package Information

- **SOT-23-3L**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°