

20V P-Channel Enhancement Mode MOSFET

Description

The NP2301FHR uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications.

General Features

- ◆ $V_{DS} = -20V$, $I_D = -2A$
 $R_{DS(ON)}(Typ.) = 137\ m\Omega$ @ $V_{GS} = -2.5V$
 $R_{DS(ON)}(Typ.) = 97\ m\Omega$ @ $V_{GS} = -4.5V$
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

Application

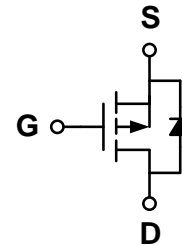
- ◆ PWM applications
- ◆ Load switch

Package

- ◆ ESOT-23-3L

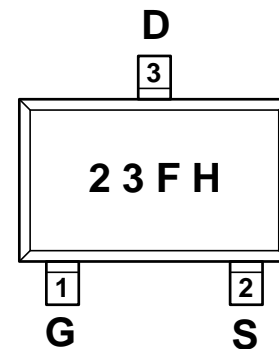


Schematic diagram



Marking and pin assignment

ESOT-23-3L
(TOP VIEW)



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP2301FHR-G	-55°C to +150°C	ESOT-23-3L	3000

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

parameter	symbol	limit	unit
Drain-source voltage	V_{DS}	-20	V
Gate-source voltage	V_{GS}	±12	V
Drain current-continuous ^a @ $T_j = 125^\circ C$ -pulse ^b	I_D	-2	A
	I_{DM}	-7.5	A
Drain-source Diode forward current	I_S	-1.25	A
Maximum power dissipation	P_D	1	W
Operating junction Temperature range	T_j	-55—150	°C

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-20	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=-20V, V_{GS}=0V$	-	-	-1	μA
Gate-body leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 12V$	-	-	± 100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.5	-0.7	-1.2	V
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-4.5V, I_D=-1.8A$	-	97	180	m Ω
		$V_{GS}=-2.5V, I_D=-1A$	-	137	275	
Forward transconductance	gfs	$V_{GS}=-5V, I_D=-1.8A$	-	5	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	$V_{DS}=-10V, V_{GS}=0V$ $f=1.0MHz$	-	148	-	pF
Output capacitance	C_{OSS}		-	26	-	
Reverse transfer capacitance	C_{RSS}		-	20	-	
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	$V_{DD}=-10V$ $I_D=-1A$ $V_{GEN}=-4.5V$ $R_L=10ohm$ $R_{GEN}=-60ohm$	-	11	-	ns
Rise time	t_r		-	5.5	-	
Turn-off delay time	$t_{D(OFF)}$		-	22	-	
Fall time	t_f		-	8	-	
Total gate charge	Qg	$V_{DS}=-10V, I_D=-1A$ $V_{GS}=-4.5V$	-	4.3	-	nC
Gate-source charge	Qgs		-	0.39	-	
Gate-drain charge	Qgd		-	0.35	-	
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V_{SD}	$V_{GS}=0V, I_S=-1.25A$	-	-0.81	-1.2	V

Notes:

- surface mounted on FR4 board, $t \leq 10sec$
- pulse test: pulse width $\leq 300\mu s$, duty $\leq 2\%$
- guaranteed by design, not subject to production testing

Thermal Characteristics

Thermal Resistance junction-to ambient	Rth JA	100	$^{\circ}C/W$
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Typical Performance Characteristics

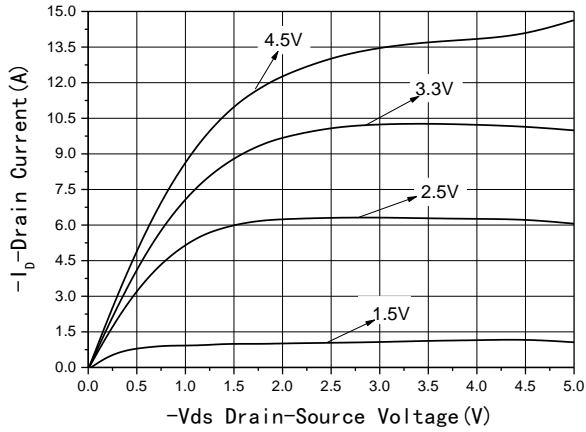


Fig1 Output Characteristics

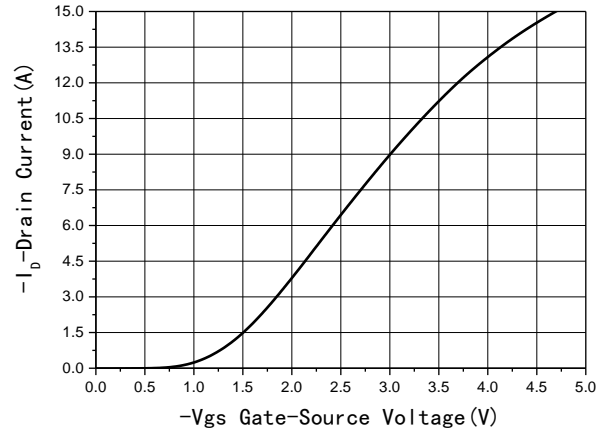


Fig2 Transfer Characteristics

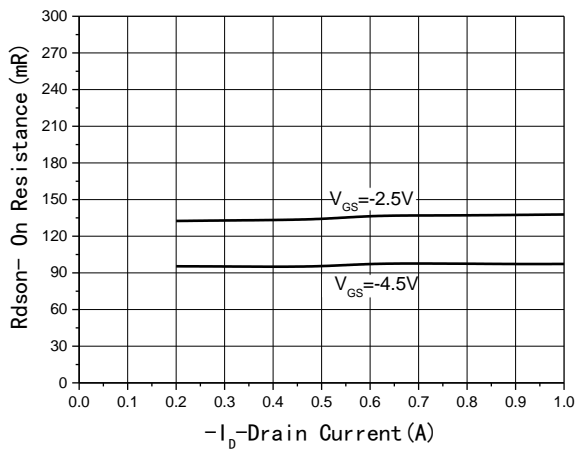


Fig3 $R_{ds(on)}$ -Drain current

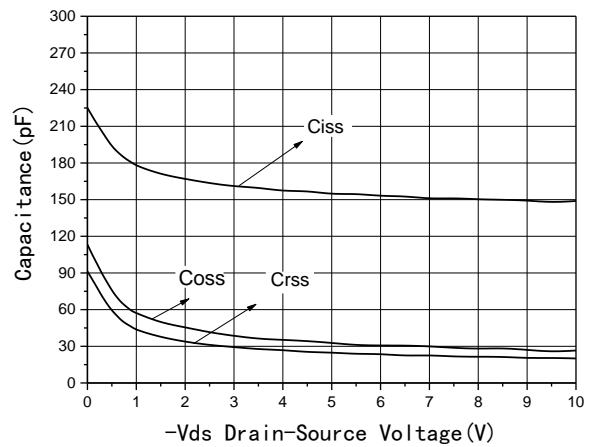


Fig4 Capacitance vs V_{ds}

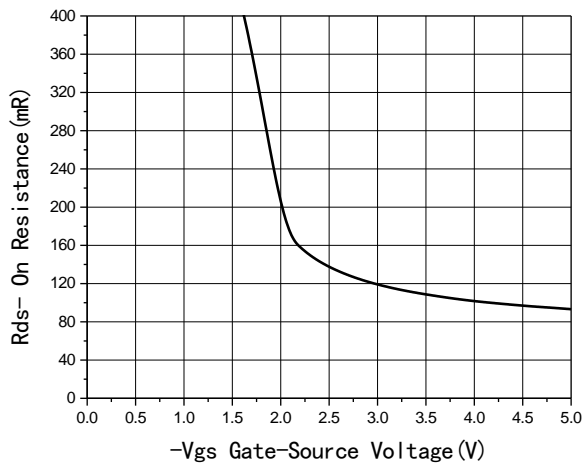


Fig5 $R_{ds(on)}$ -Gate Drain voltage

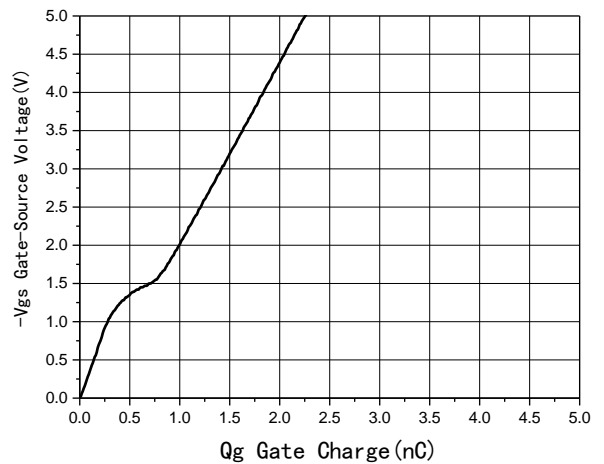


Fig6 Gate Charge

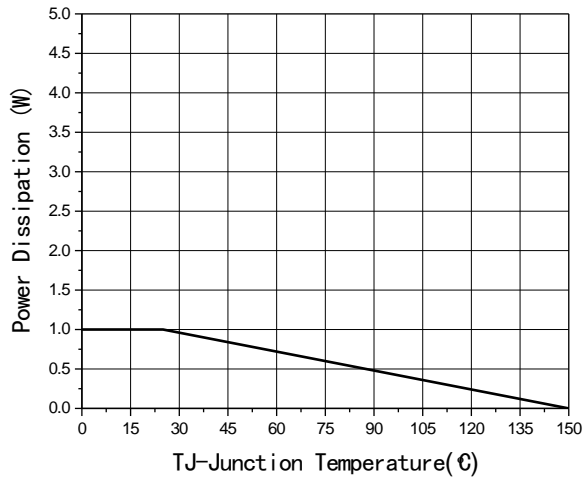


Fig7 Power De-rating

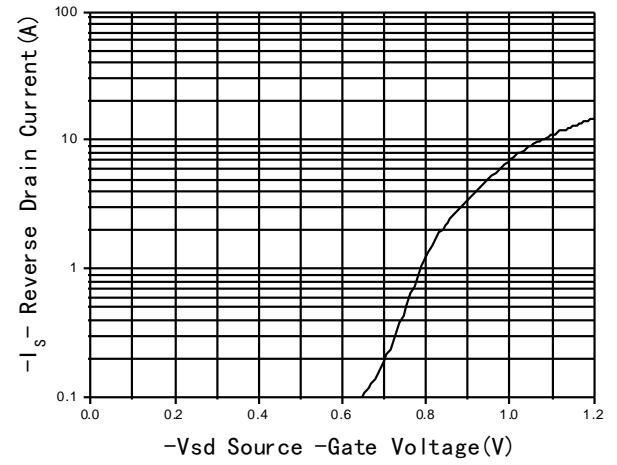
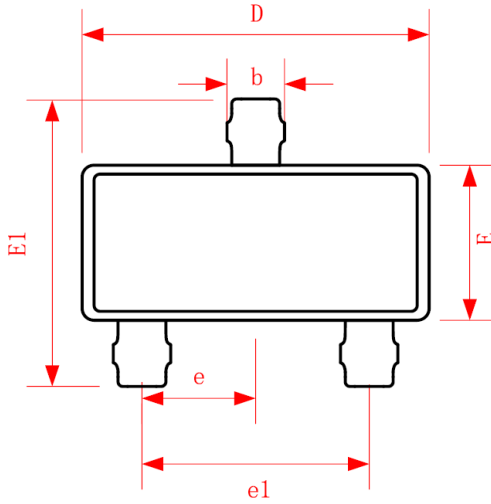


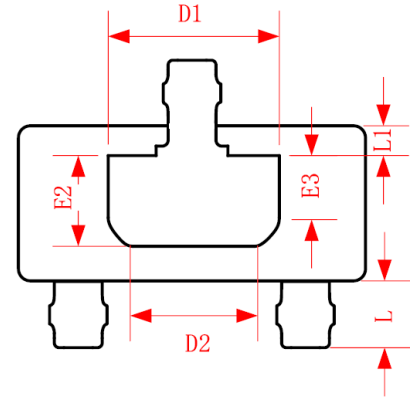
Fig8 Source-Drain Diode Forward

Package Information

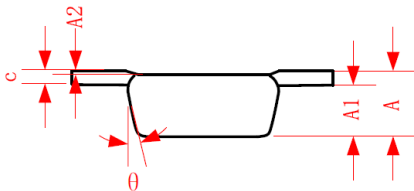
- SOT-23



Top View
【顶视图】



Bottom View
【背视图】



Side View
【侧视图】

Symbol	Dimensions In Millimeters		
	Min.	REF.	Max.
A	0.500	0.550	0.600
A1	0.368	0.398	0.428
A2	-0.030	0.000	0.030
c	0.152Ref		
D	2.850	2.900	2.950
E	1.250	1.300	1.350
E1	2.350	2.400	2.450
D1	1.405	1.430	1.455
D2	0.995	1.020	1.045
E2	0.735	0.760	0.785
E3	0.490	0.520	0.545
L	0.525	0.550	0.575
L1	0.235	0.260	0.285
e	0.950Ref		
e1	1.800	1.900	2.000
b	0.410	0.480	0.550
θ	14°	15°	16°