

20V P-Channel Enhancement Mode MOSFET

Description

The NP2301BVR 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

- ◆ $V_{DS} = -20V$, $I_D = -2A$
 $R_{DS(ON)}(Typ.) = 108m\Omega$ @ $V_{GS} = -4.5V$
 $R_{DS(ON)}(Typ.) = 136m\Omega$ @ $V_{GS} = -2.5V$
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

Application

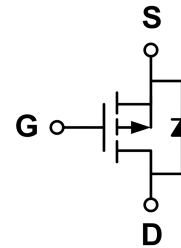
- ◆ PWM applications
- ◆ Load switch

Package

- ◆ SOT-23

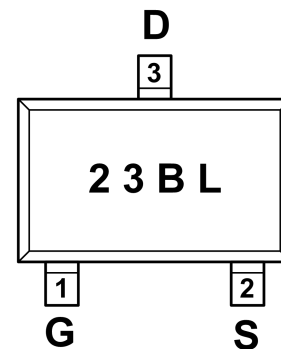


Schematic diagram



Marking and pin assignment

SOT-23
(TOP VIEW)



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP2301BVR-G	-55°C to +150°C	SOT-23	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 (Silicon Limited)	I_D	$T_A = 25^\circ C$	-2	A
		$T_A = 70^\circ C$	-1.6	A
Pulsed Drain Current (Package Limited)	I_{DM}	-17	A	
Maximum power dissipation	P_D	$T_A = 25^\circ C$	2.1	W
		$T_A = 70^\circ C$	1.3	
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
Body-Diode Continuous current	I_S	-	-	-2	-	A
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.5	-1	-1.5	V
Drain-source on-state resistance	$R_{DS(ON)}$	$V_{GS}=-4.5V, I_D=-2A$	-	108	120	m Ω
		$V_{GS}=-2.5V, I_D=-1A$	-	136	150	
Forward transconductance	g_{fs}	$V_{GS}=-5V, I_D=-2A$	-	6.8	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	$V_{DS}=-10V, V_{GS}=0V$ $f=1.0MHz$	-	410	-	pF
Output capacitance	C_{OSS}		-	38	-	
Reverse transfer capacitance	C_{RSS}		-	34	-	
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	$V_{DS}=-10V$ $I_D=-1A$ $V_{GS}=-4.5V$ $R_L=5\Omega$ $R_{GEN}=3\Omega$	-	11	-	ns
Rise time	t_r		-	5,5	-	
Turn-off delay time	$t_{D(OFF)}$		-	22	-	
Fall time	t_f		-	8	-	
Total gate charge	Q_g	$V_{DS}=-10V, I_D=-2A$ $V_{GS}=-4.5V$	-	10.6	-	nC
Gate-source charge	Q_{gs}		-	1	-	
Gate-drain charge	Q_{gd}		-	1.1	-	
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V_{SD}	$V_{GS}=0V, I_S=-1A$	-	-0.76	-1	V

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient	$t_s \leq 10s$	65	90	$^{\circ}C/W$
Maximum Junction-to-Ambient	Steady-State		85	
Maximum Junction-to-Lead	Steady-State	$R_{\theta JC}$	43	

Typical Performance Characteristics

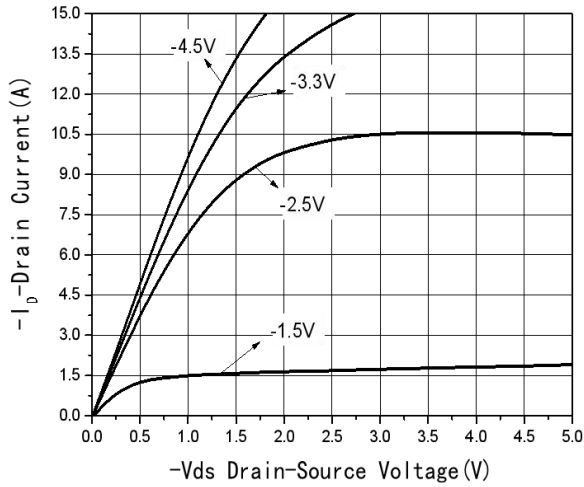


Fig1 Output Characteristics

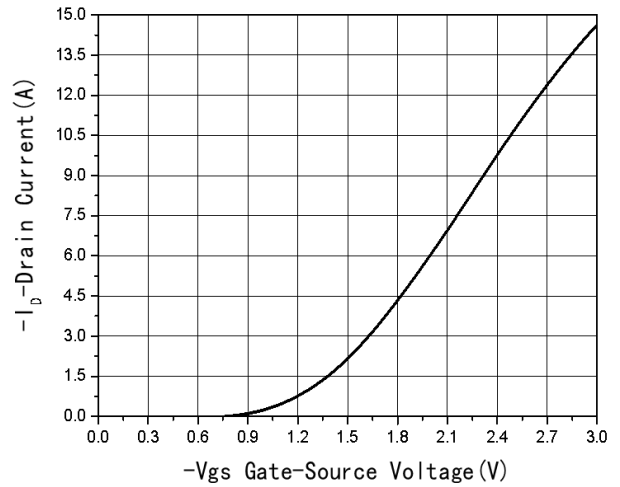


Fig2 Transfer Characteristics

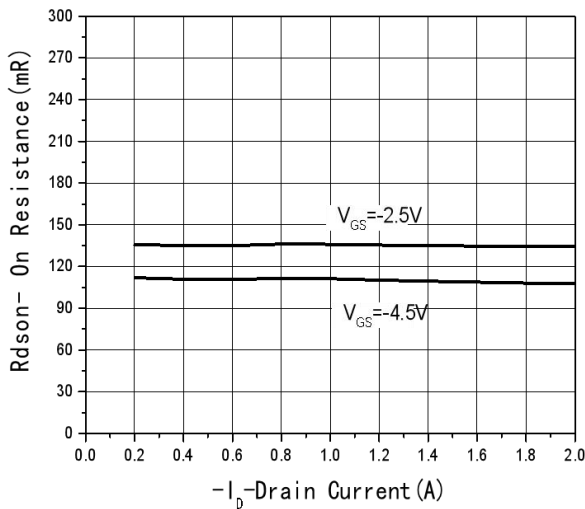


Fig3 Rdson-Drain current

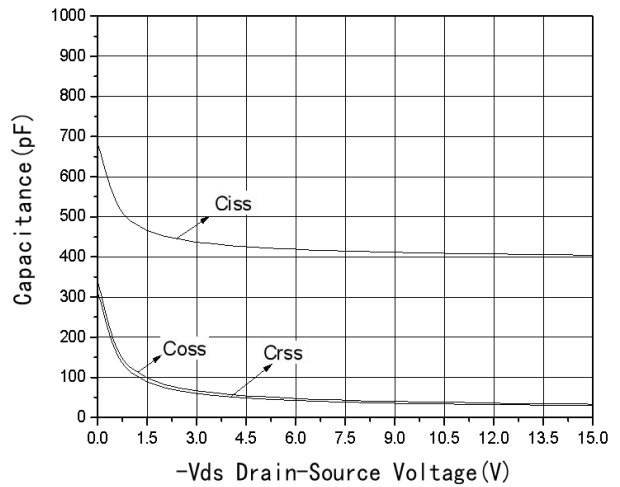


Fig4 Capacitance vs Vds

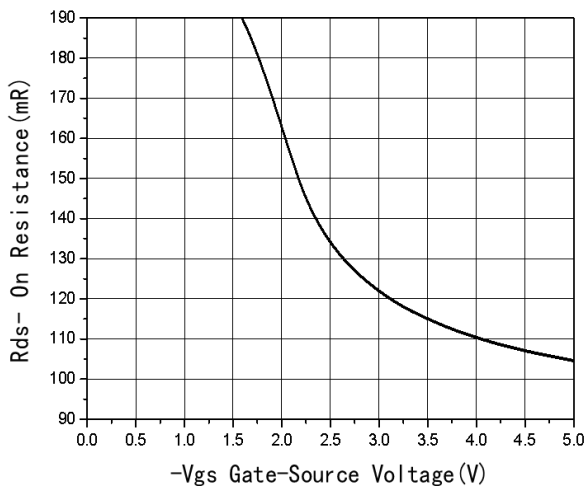


Fig5 Rdson-Gate Drain voltage

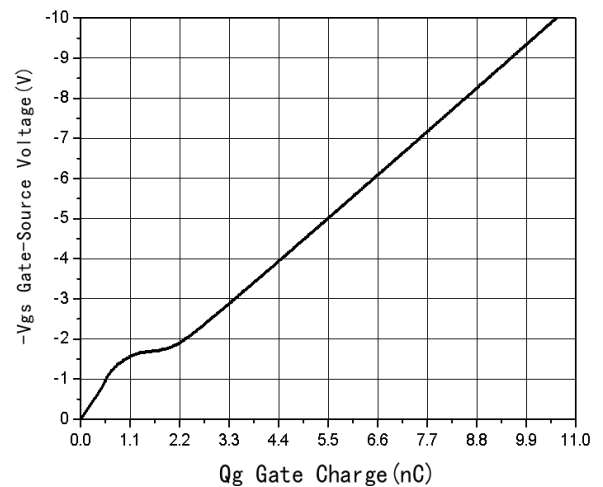


Fig6 Gate Charge

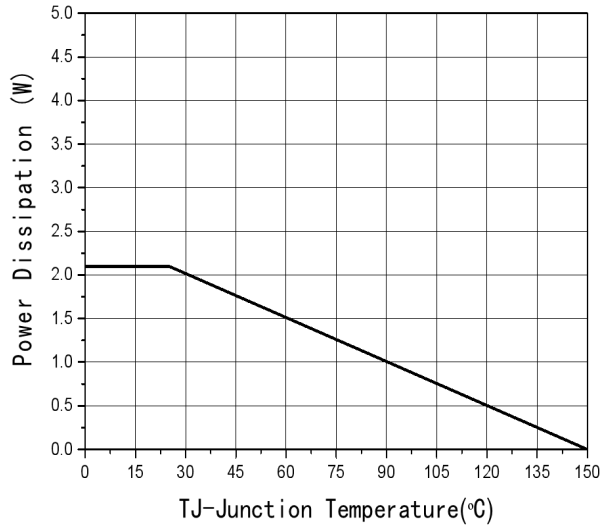


Fig7 Power De-rating

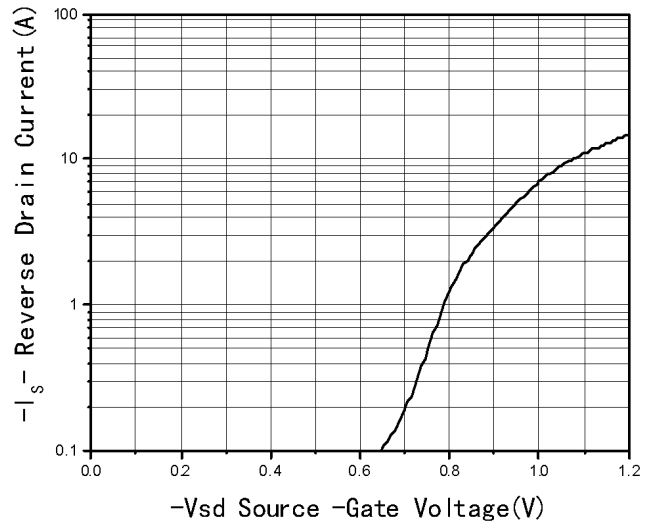
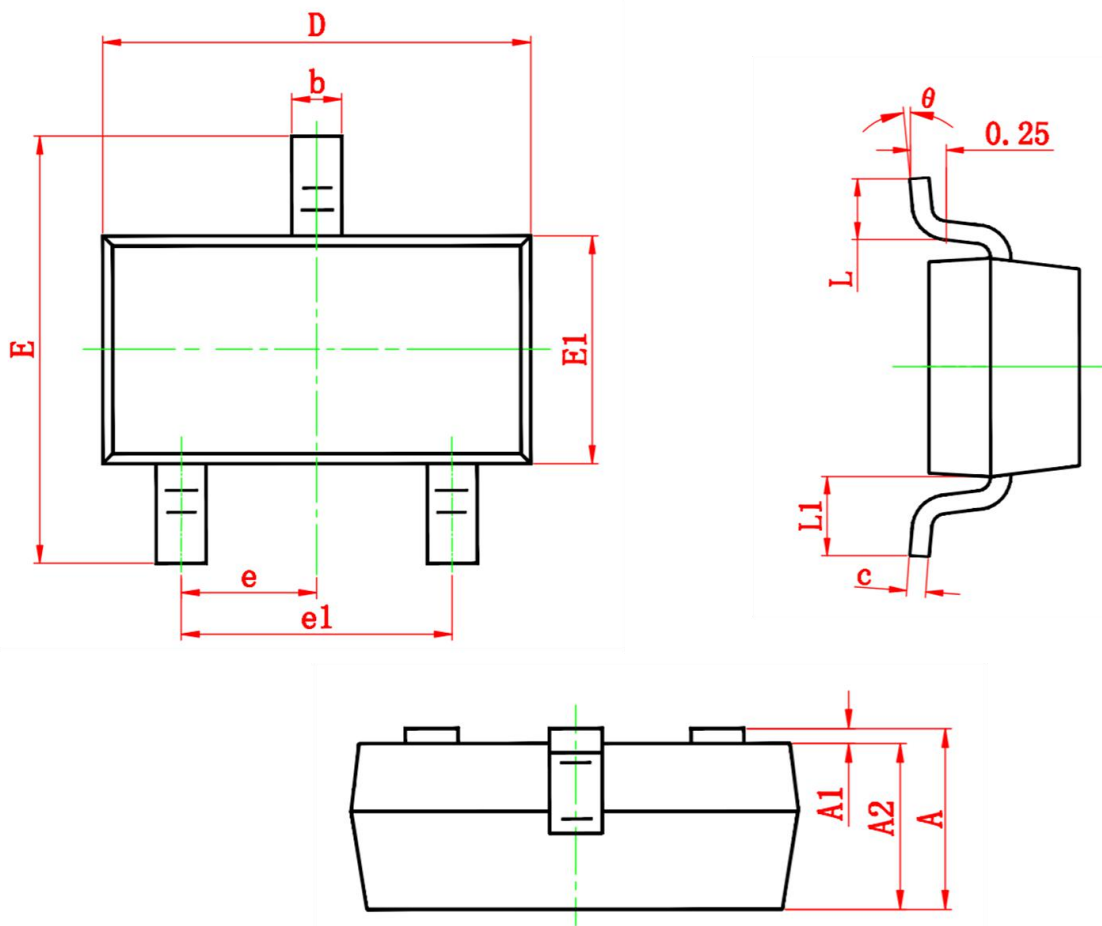


Fig8 Source-Drain Diode Forward

Package Information

- SOT-23



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	2.250	2.550	0.089	0.100
E1	1.200	1.400	0.047	0.055
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.300	0.500	0.012	0.020
L1	0.550 REF.		0.022 REF.	
θ	0°	8°	0°	8°