P-Channel Enhancement Mode MOSFET

Description

The NP2301A 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 =-2.8A
  $R_{DS(ON)}$(Typ.)=75mΩ @V_{GS}=-2.5V
  $R_{DS(ON)}$(Typ.)=60mΩ @V_{GS}=-4.5V
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

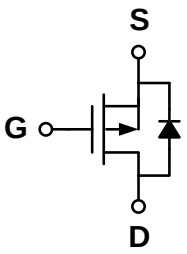
Application

- PWM applications
- Load switch

Package

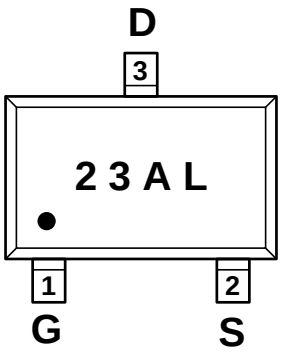
- SOT-23-3L

Schematic diagram



Marking and pin assignment

SOT-23-3L
(TOP VIEW)



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP2301AMR	-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}	-20	V
Gate-source voltage	V_{GS}	±12	V
Drain current-continuous[a]@Tj=125℃	I_D	-2.8	A
-pulse *d*[b]	I_{DM}	-11	A
Drain-source Diode forward current	Is	-1.25	A
Maximum power dissipation	P_D	1.2	W
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	-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	-0.4	-0.65	-1.2	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-2.8A	-	60	80	mΩ
		V_{GS}=-2.5V, I_D=-2.8A	-	75	120	
Forward transconductance	gfs	V_{GS}=-5V, I_D=-5A	-	5	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=-10V ,V_{GS}=0V f=1.0MHz	-	561	-	pF
Output capacitance	C_{OSS}		-	61	-	
Reverse transfer capacitance	C_{RSS}		-	52	-	
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DD}=-10V I_D=-2.8A V_{GEN}=-4.5V R_L=10ohm R_{GEN}=-60ohm	-	12.5	-	ns
Rise time	tr		-	6.6	-	
Turn-off delay time	$t_{D(OFF)}$		-	113	-	
Fall time	tf		-	46.6	-	
Total gate charge	Qg	V_{DS}=-10V,I_D=-3A V_{GS}=-4.5V	-	6.1	-	nC
Gate-source charge	Qgs		-	1.7	-	
Gate-drain charge	Qgd		-	1.2	-	
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V_{SD}	V_{GS}=0V,Is=-1.25A	-	-0.81	-1.2	V

Notes:

a. surface mounted on FR4 board,t≤10sec

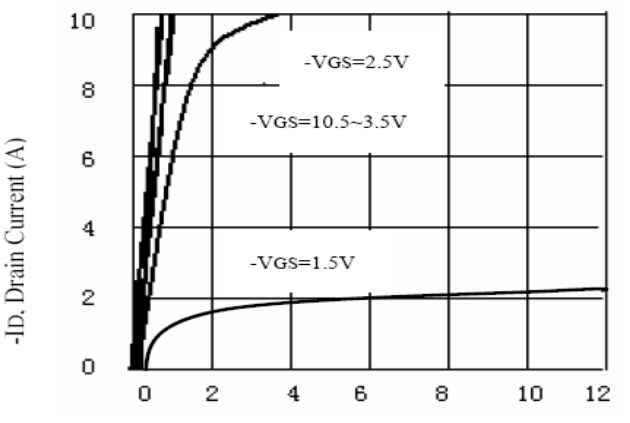
b. pulse test: pulse width≤300μs,duty≤2%

c. guaranteed by design, not subject to production testing

Thermal Characteristics

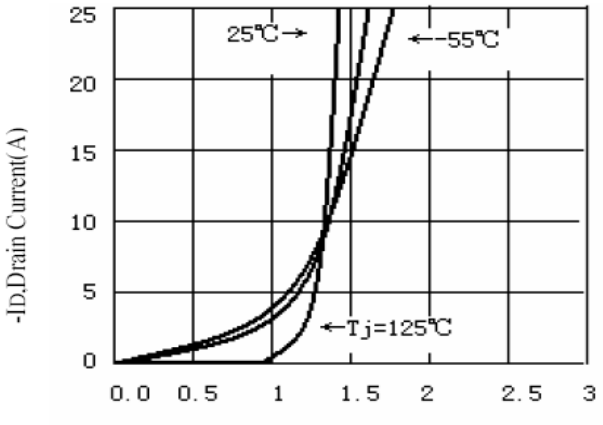
Thermal Resistance junction-to ambient	Rth JA	100	℃/W

Typical Performance Characteristics



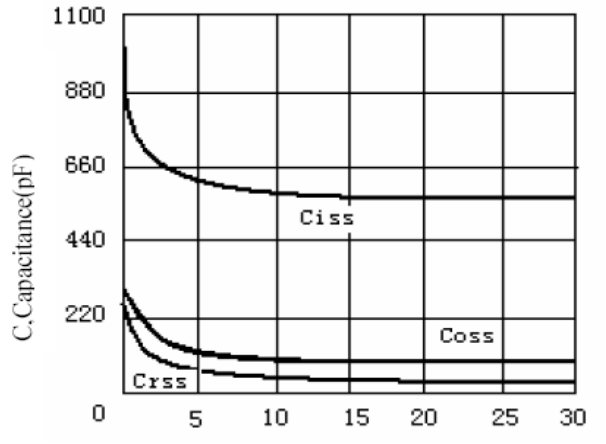
- VDS, Drain-to-Source Voltage (V)

Figure 1. Output Characteristics



-VGS, Gate-to-source Voltage (V)

Figure 2. Transfer Characteristics



- VGS, Drain-to Source Voltage

Figure3. Capacitance

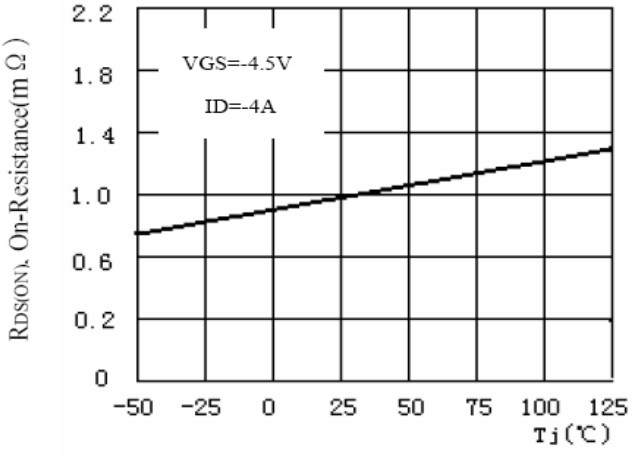
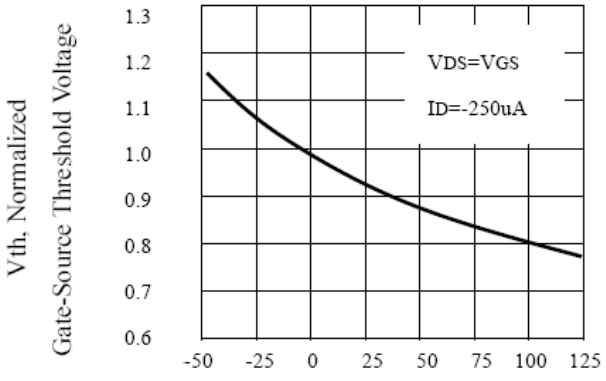
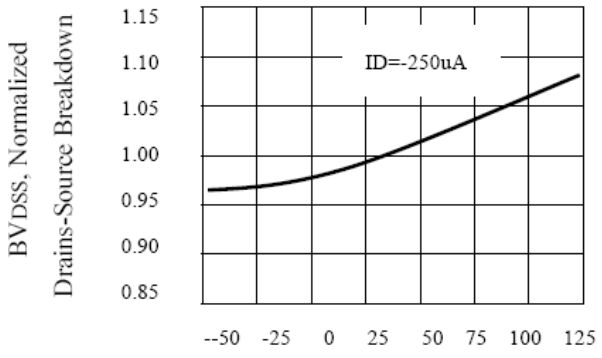


Figure4. On-Resistance Variation with Temperature



Tj,. Junction Temperature(℃)

Figure5.Gate Threshold Variation With Temperature



Tj, .Junction Temperature (℃)

Figure6.Breakdown Voltage Variation With Temperature

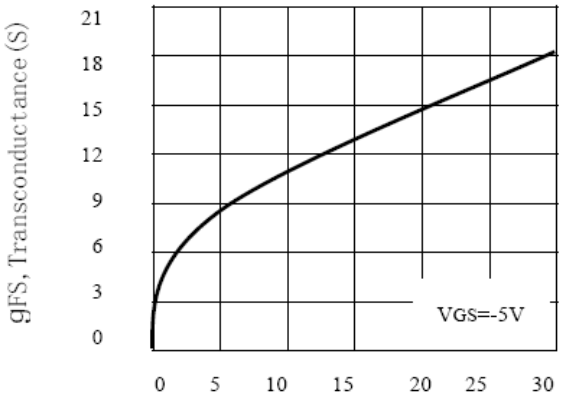


Figure7.Transconductance Variation With Drain Current

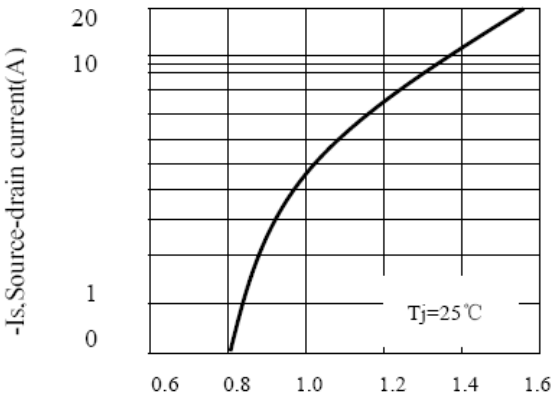


Figure8.Body Diode Forward Voltage Variation with Source Current

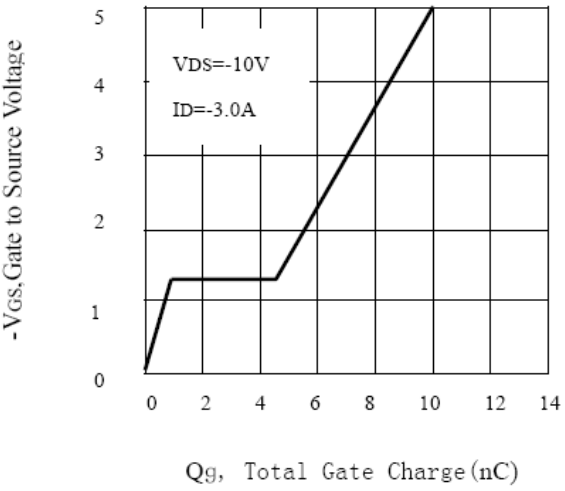


Figure9. Gate Charge

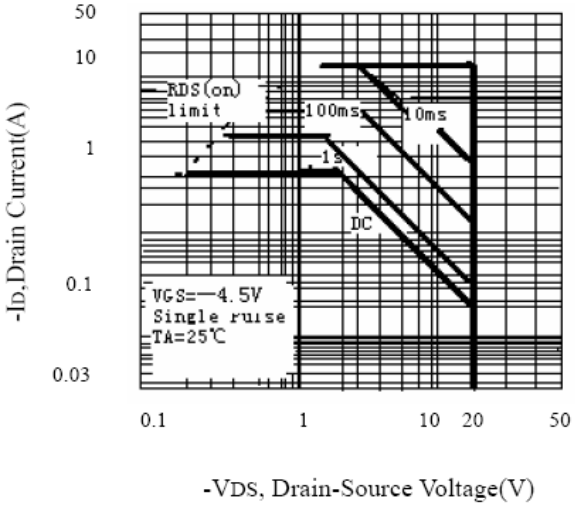
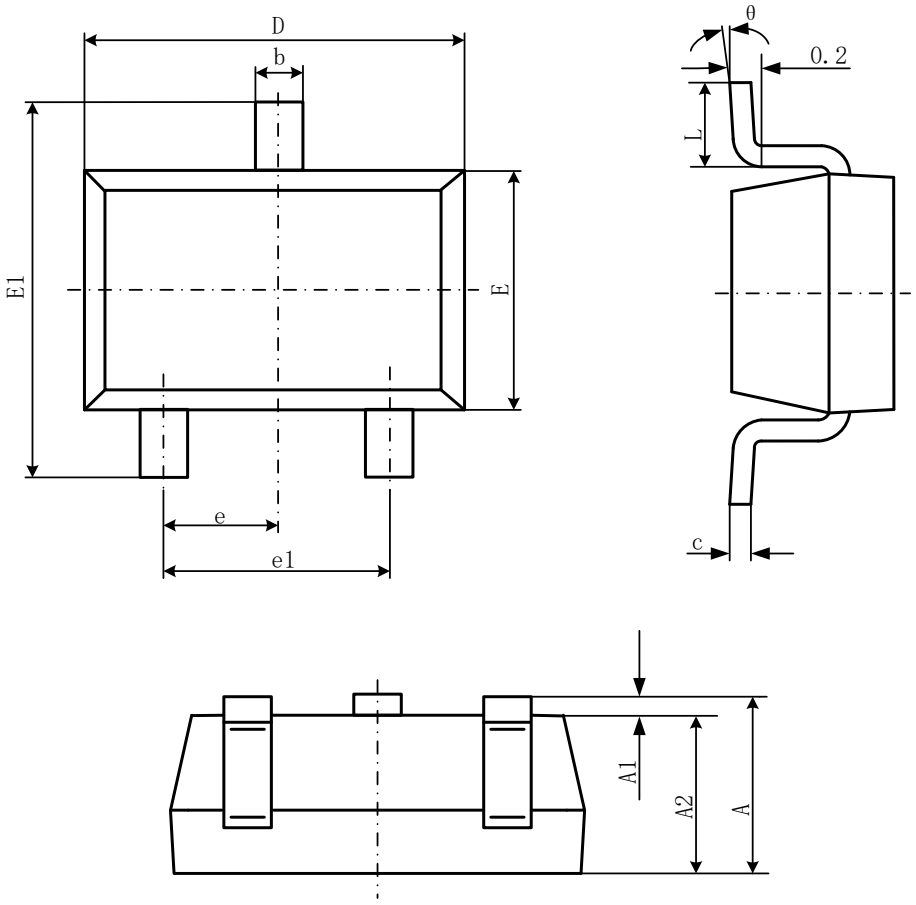


Figure10.Maximum Safe Operating Area

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°

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