

30V P-Channel Enhancement Mode MOSFET

Description

The NP3401VR-S uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.

General Features

- ◆ $V_{DS} = -30V$, $I_D = -4A$
 $R_{DS(ON)}(Typ.) = 60m\Omega$ @ $V_{GS} = -4.5V$
 $R_{DS(ON)}(Typ.) = 80m\Omega$ @ $V_{GS} = -2.5V$
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

Application

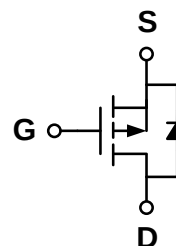
- ◆ PWM applications
- ◆ Load switch

Package

- ◆ SOT-23

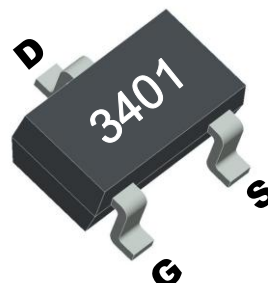


Schematic diagram



Marking and pin assignment

SOT-23
(TOP VIEW)



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP3401VR-S-G	-55°C to +150°C	SOT23	3000

Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	-30	V
Gate-source voltage		V_{GS}	± 12	V
Continuous Drain Current	25°C	I_D	-4	A
	100°C		-3	
Pulsed Drain Current		I_{DM}	-24	A
Power Dissipation ^B	25°C	P_D	1.25	W
	100°C		0.55	
Operating junction Temperature range		T_J	-55—150	°C

Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	-30	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =V, V _{GS} =0V	-	-	-1	μA
Gate Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±12V	-	-	±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	-0.5	-0.8	-1	V
Drain-source on-state resistance	R _{DS(ON)}	V _{GS} =-4.5V, I _D =-4A	-	60	80	mΩ
		V _{GS} =-2.5V, I _D =-4A	-	80	96	
Forward Transconductance	g _{FS}	V _{DS} =-15V,I _D =4A	-	10	-	S
Diode Characteristics						
Diode Forward Voltage	V _{SD}	I _{SD} =-2A,V _{GS} =0V	-	-0.8	-1.2	V
Diode Continuous Forward Current	I _S		-	-	-4	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = I _S , di/dt = 100A/μs	-	11	-	ns
Reverse Recovery Charge	Q _{rr}		-	4.2	-	nC
Dynamic Characteristics						
Input capacitance	C _{ISS}	V _{GS} =0V ,V _{DS} =-15V f=1.0MHz	-	510	-	pF
Output capacitance	C _{OSS}		-	52	-	
Reverse transfer capacitance	C _{RSS}		-	45	-	
Turn-on delay time	t _{D(ON)}	V _{GS} =-5V, V _{DS} =-15V, R _L =1.5Ω, R _G =3Ω	-	7	-	ns
Turn-on Rise time	tr		-	3	-	
Turn-off delay time	t _{D(OFF)}		-	30	-	
Turn-off Fall time	t _f		-	12	-	
Total gate charge	Q _g	V _{GS} =-5V, V _{DS} =-15V, I _D =-4A	-	6.6	-	nC
Gate-source charge	Q _{gs}		-	5.8	-	
Gate-drain charge	Q _{gd}		-	0.6	-	

Thermal Characteristics

Thermal Resistance, Junction-to-Ambient ^B	$R_{\theta JA}$	100	$^{\circ}\text{C/W}$
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B. The power dissipation P_D is based on $T_{J(MAX)}=150^{\circ}\text{C}$, using junction-to-Ambient thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Surface Mounted on FR4 Board, $t \leq 10$ sec.

Typical Performance Characteristics

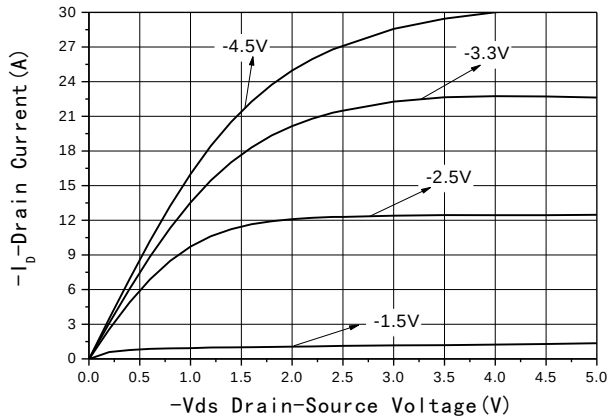


Fig1 Output Characteristics

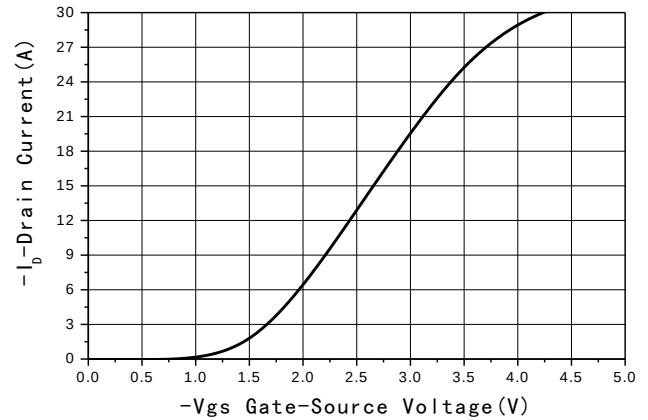


Fig2 Transfer Characteristics

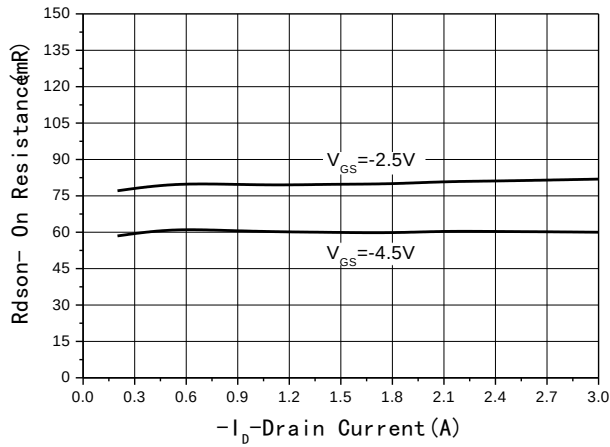


Fig3 Rdson-Drain current

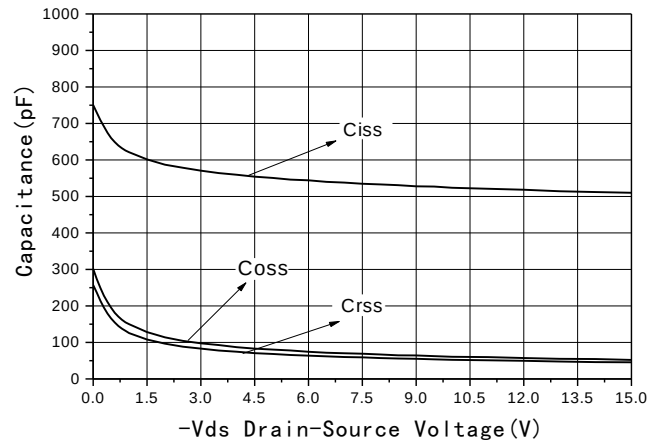


Fig4 Capacitance vs Vds

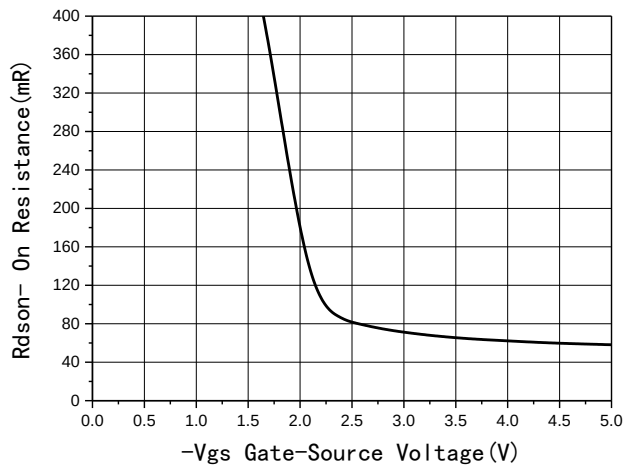


Fig5 Rdson-Gate Drain voltage

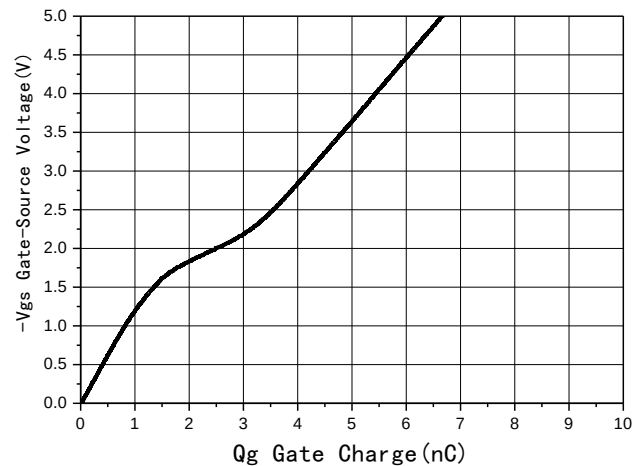


Fig6 Gate Charge

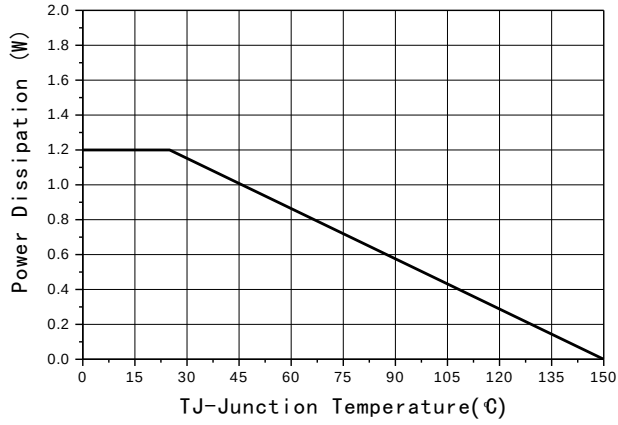


Fig7 Power De-rating

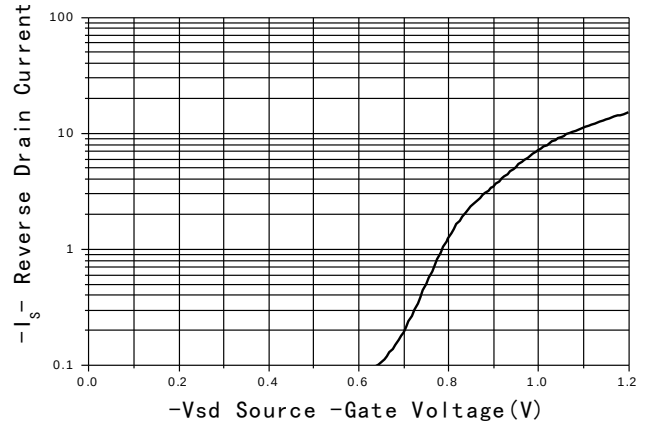


Fig8 Source-Drain Diode Forward

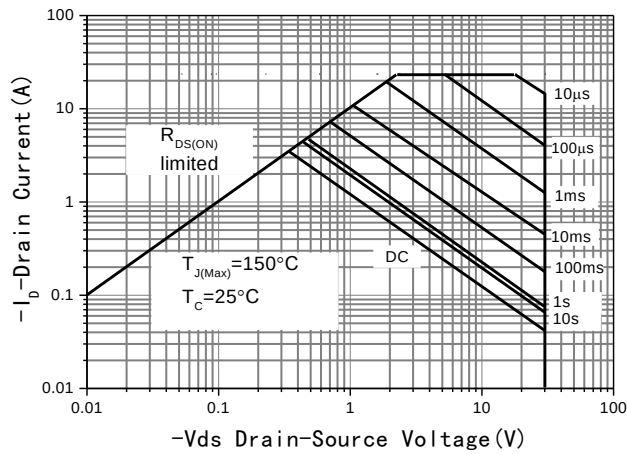


Fig9 Safe Operating Area

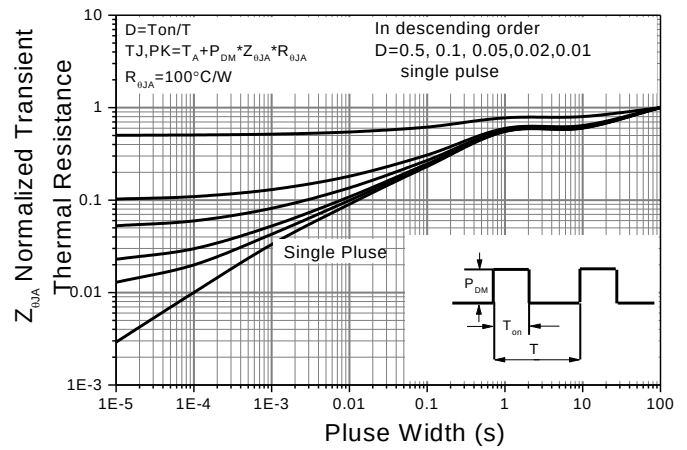
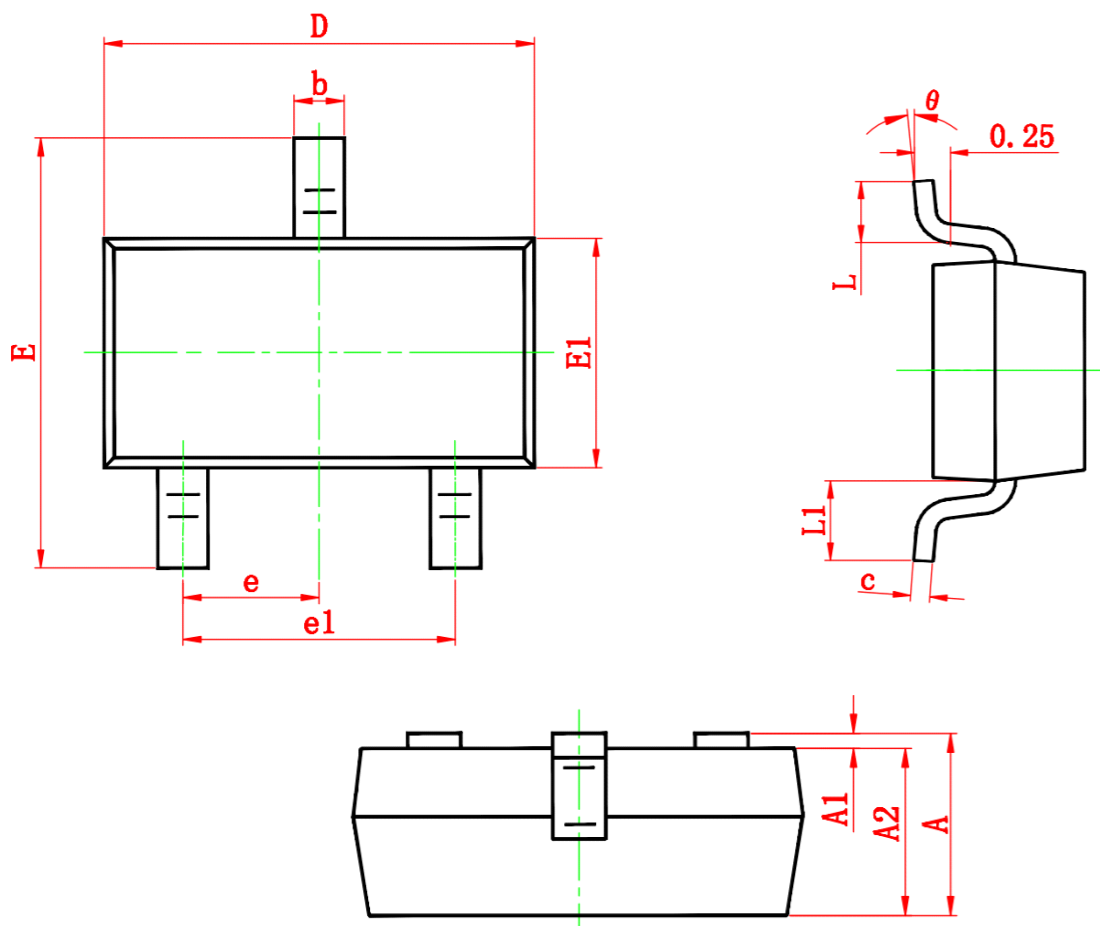


Fig10 Transient Thermal Response Curve

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°