

## Description

The ENP3401 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

- $V_{DS} = -30V$  ,  $I_D = -4.2A$   
 $R_{DS(ON)}(Typ.)=39m\Omega @V_{GS}= -10V$   
 $R_{DS(ON)}(Typ.)=48m\Omega @V_{GS}= -4.5V$   
 $R_{DS(ON)}(Typ.)=60m\Omega @V_{GS}= -2.5V$
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

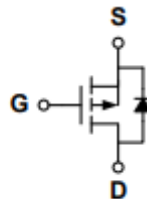
## Application

- PWM applications
- Load switch

## Package

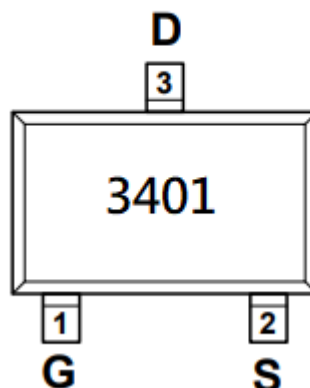
- SOT-23-3L

## Schematic diagram



## Marking and pin assignment

SOT-23-3L  
(TOP VIEW)





## Ordering Information

ENP3401 XX GR↓  
B1=SOT-23-3L

## Absolute Maximum Ratings (TA=25°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	TC=25°C	$I_D$	-4.2	A
	TC=70°C		-3.0	
Pulsed Drain Current <sup>C</sup>		$I_{DP}$	-16.8	A
power dissipation <sup>B</sup>	TC=25°C	$P_D$	1.4	W
	TC=70°C		0.9	
Junction and Storage Temperature Range		$T_J, T_{SGT}$	-55—150	°C

**Electrical Characteristics**

(TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Drain-source breakdown voltage	BVDSS	VGS=0V, ID=-250μA	-30	-	-	V
Zero gate voltage drain current	IDSS	VDS=-30V, VGS=0V	-	-	-1	μA
Gate-body leakage	IGSS	VDS=0V, VGS=±12V	-	-	±100	nA
<b>ON Characteristics</b>						
Gate threshold voltage	VGS(th)	VDS=VGS, ID=-250μA	-0.5	-0.9	1.5	V
Drain-source on-state resistance	RDS(ON)	VGS=-10V, ID=-4A	-	39	50	mΩ
		VGS=-4.5V, ID=-3A	-	48	60	
		VGS=-2.5V, ID=-1A	-	60	75	
Forward transconductance	gfs	VDS=-5V, ID=-4.2A	-	5	-	S
<b>Dynamic Characteristics</b>						
Input capacitance	CISS	VDS=-10V, VGS=0V f=1.0MHz	-	900	-	pF
Output capacitance	COSS		-	85	-	
Reverse transfer capacitance	CRSS		-	60	-	
Gate resistance	Rg	VDS=15mV , f=1.0MHz	-	1	-	Ω
<b>Switching Characteristics</b>						
Turn-on delay time	tD(ON)	VDD=-15V ID=-4.2A VGEN=-10V RL=10ohm RGEN=6ohm	-	2.8	3.5	ns
Rise time	tr		-	31	35	
Turn-off delay time	tD(OFF)		-	50	55	
Fall time	tf		-	8	12	
Total gate charge	Qg	VDS=-15V, ID=-4.2A VGS=-4.5V	-	8.8	-	nC
Gate-source charge	Qgs		-	1.8	-	
Gate-drain charge	Qgd		-	2.7	-	
Body Diode Reverse Recovery Time	trr	IF=-4.2A, dI/dt=100A/ms	-	22	-	nS
Body Diode Reverse Recovery Charge	Qrr	IF=-4.2A, dI/dt=100A/ms	-	1.8	-	nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
Diode forward voltage	VSD	VGS=0V, Is=-4.2A	-	-0.81	-1.2	V



## Thermal Characteristics

Parameter		Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10s$	$R_{\theta JA}$	70	90	°C/W
Maximum Junction-to-Ambient <sup>A D</sup>	Steady-State		100	125	
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	62	80	

- A.** The value of  $R_{\theta JA}$  is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ C$ . The value in any given application depends on the user's specific board design.
- B.** The power dissipation PD is based on  $T_J(MAX) = 150^\circ C$ , using  $\leq 10s$  junction-to-ambient thermal resistance.
- C.** Repetitive rating, pulse width limited by junction temperature  $T_J(MAX) = 150^\circ C$ . Ratings are based on low frequency and duty cycles to keep initial  $T_J = 25^\circ C$ .
- D.** D. The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to lead  $R_{\theta JL}$  and lead to ambient.

## Typical Performance Characteristics

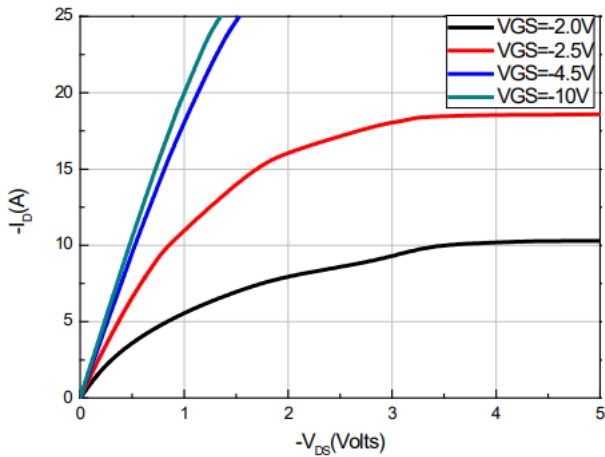


Fig 1: On-Region Characteristics

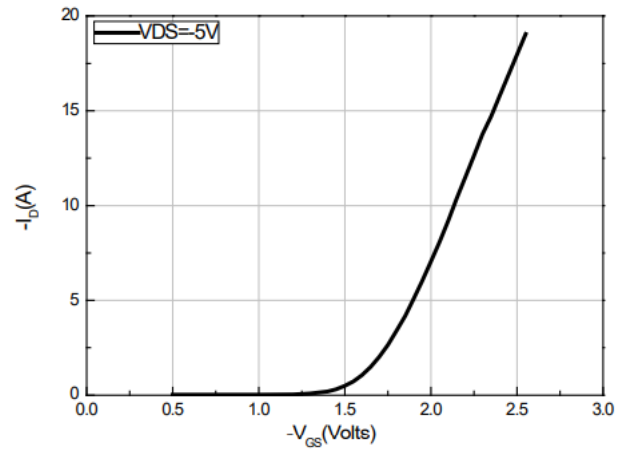


Figure 2: Transfer Characteristics

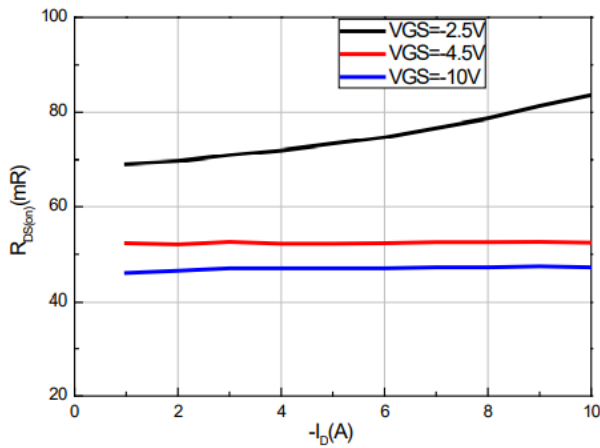


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

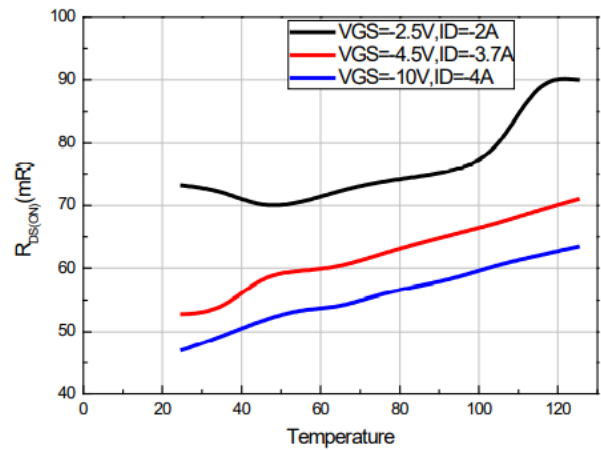


Figure 4: On-Resistance vs. Junction Temperature

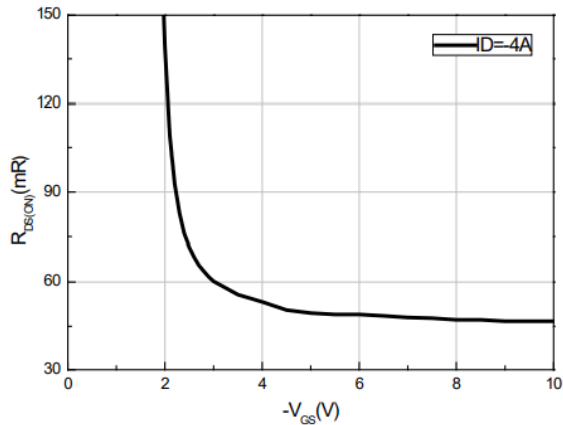


Figure 5: On-Resistance vs. Gate-Source Voltage

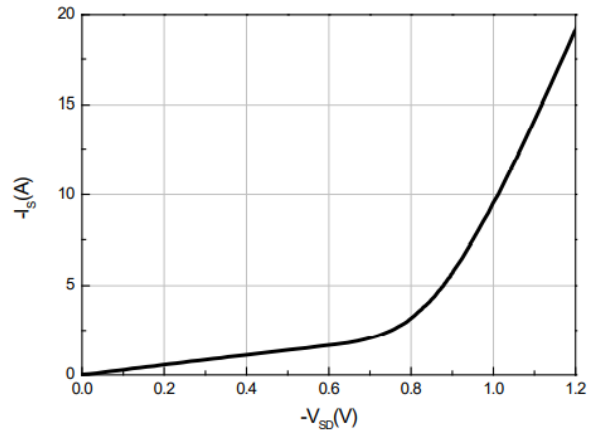
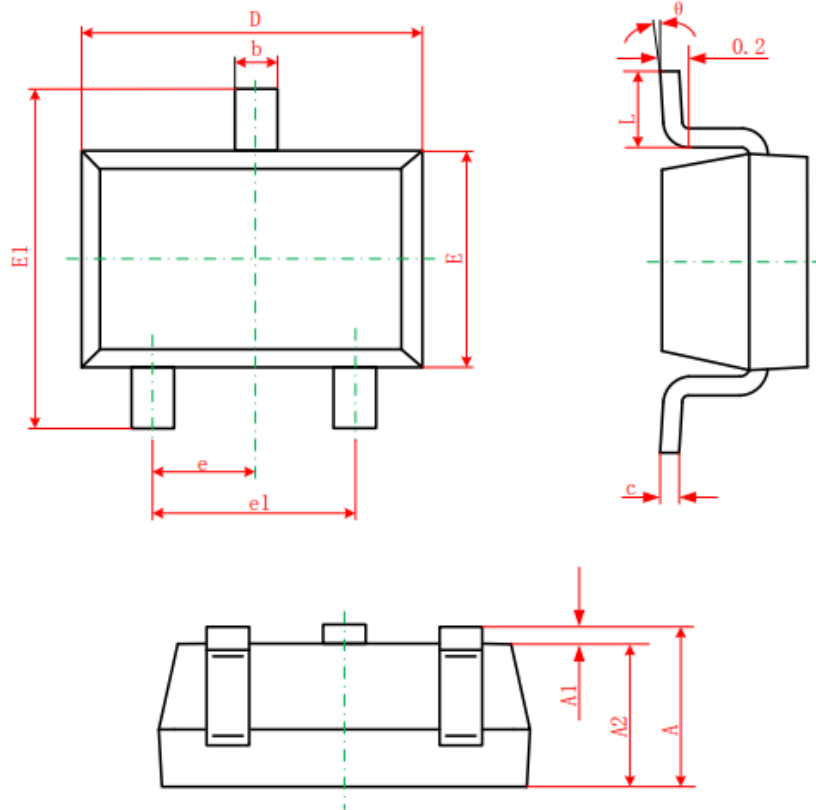


Figure 6: Body-Diode Characteristics

**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°