30V P-Channel Enhancement Mode MOSFET

Description

The NP9435ASR-S uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in load switch and battery protection applications.

General Features

- V_{DS} =-30V，I_D =-6A
  $R_{DS(ON)}$(Typ.)=66mΩ @V_{GS}=-10V
  $R_{DS(ON)}$(Typ.)=96mΩ @V_{GS}=-4.5V
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

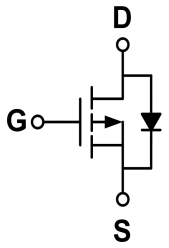
Application

- Battery protection
- Load switch

Package

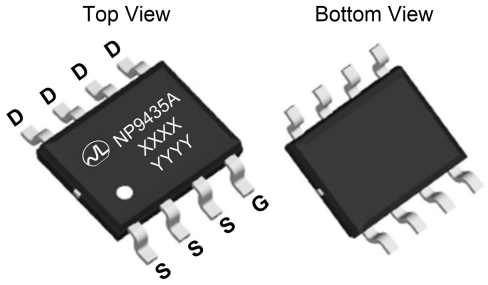
- SOP-8

Schematic diagram



Marking and pin assignment

SOP-8



XXXX—Wafer Information

YYYY—Quality Code

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP9435ASR-S-G	-55°C to +150°C	SOP-8	4000

Absolute Maximum Ratings (TA=25℃ unless otherwise noted)

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	-30	V
Gate-source voltage		V_{GS}	±20	V
Continuous Drain Current	T_A=25°C	I_D	-6	A
	T_A=70°C		-4.2	
Pulsed Drain Current [C]		I_{DP}	-24	A
Avalanche energy(L=0.1mH) [C]		E_{AS}	16	mJ
Maximum power dissipation [B]	T_A=25°C	P_D	3.1	W
	T_A=70°C		2	
Operating junction Temperature range		T_J	-55—150	℃

Thermal Characteristics

Parameter		Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient[A]	≤ 10s	$R_{\theta JA}$	30	40	℃/W
Maximum Junction-to-Ambient[A D]	Steady-State		59	75	
Maximum Junction-to-Lead[B]	Steady-State	$R_{\theta JL}$	16	24	

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°C. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low frequency and duty cycles to keep initial T_J=25°C.

D. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.

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	-30	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=-30V, V_{GS}=0V	-	-	-1	μA
Gate-body leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.8	-1.4	-2.5	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-2A	-	66	85.5	mΩ
		V_{GS}=-4.5V, I_D=-2 A		96	125	
Forward transconductance	gfs	V_{DS}=-5V, I_D=-2A	-	19	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=-15V ,V_{GS}=0V f=1.0MHz	-	279	-	pF
Output capacitance	C_{OSS}		-	45	-	
Reverse transfer capacitance	C_{RSS}		-	38	-	
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DS}=-15V I_D=-1A V_{GS}=-10V R_{GEN}=6Ω	-	6.5	-	ns
Rise time	tr		-	3.5	-	
Turn-off delay time	$t_{D(OFF)}$		-	43	-	
Fall time	tf		-	9	-	
Total gate charge	Qg	V_{DS}=-15V,I_D=-2A V_{GS}=-10V	-	6.5	-	nC
Gate-source charge	Qgs		-	1.7	-	
Gate-drain charge	Qgd		-	702	-	
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V_{SD}	V_{GS}=0V,Is=-1.0A	-	-0.75	-1.0	V

Typical Performance Characteristics

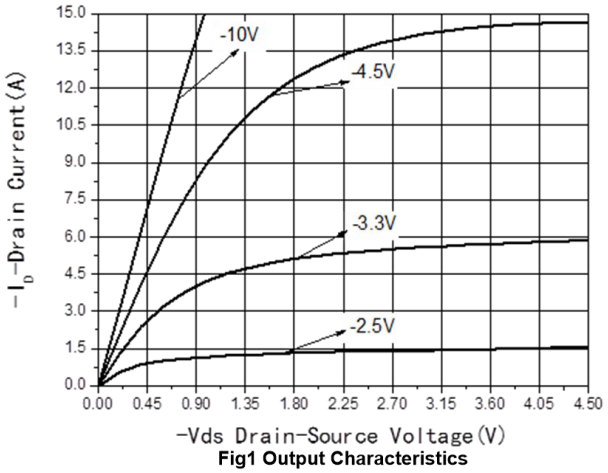


Fig1 Output Characteristics

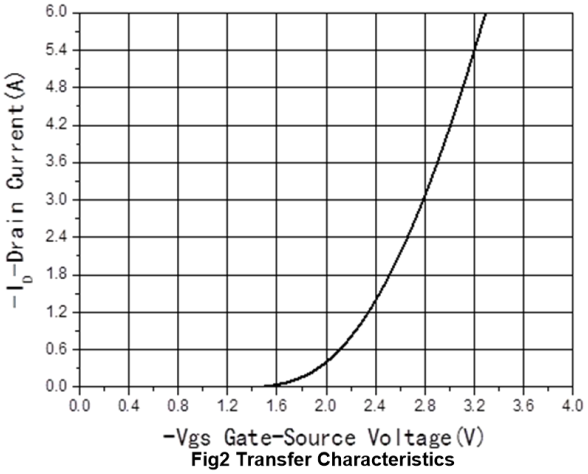


Fig2 Transfer Characteristics

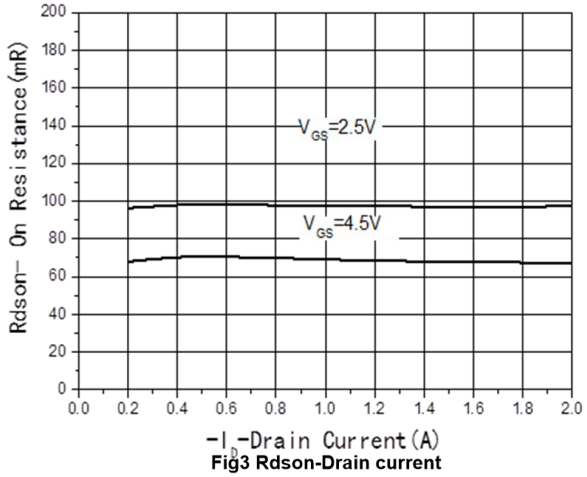


Fig3 Rdson-Drain current

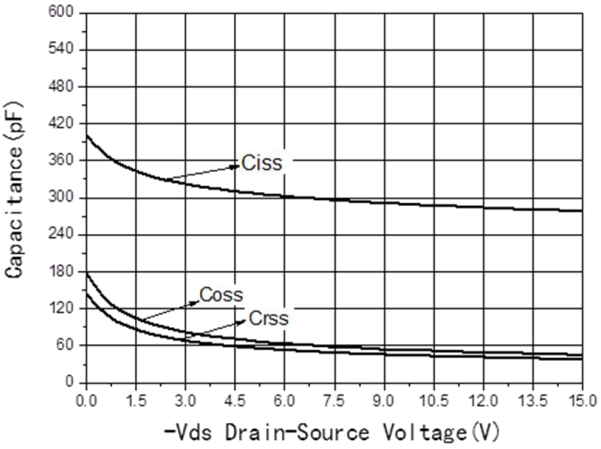


Fig4 Capacitance vs Vds

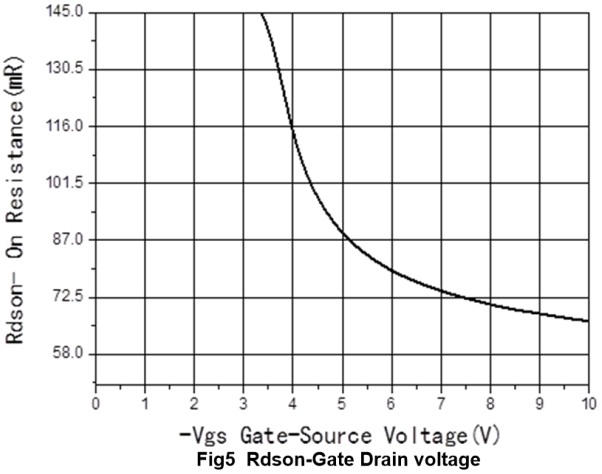


Fig5 Rdson-Gate Drain voltage

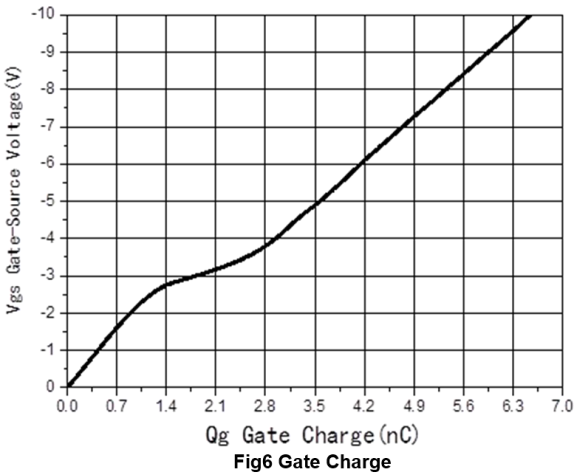


Fig6 Gate Charge

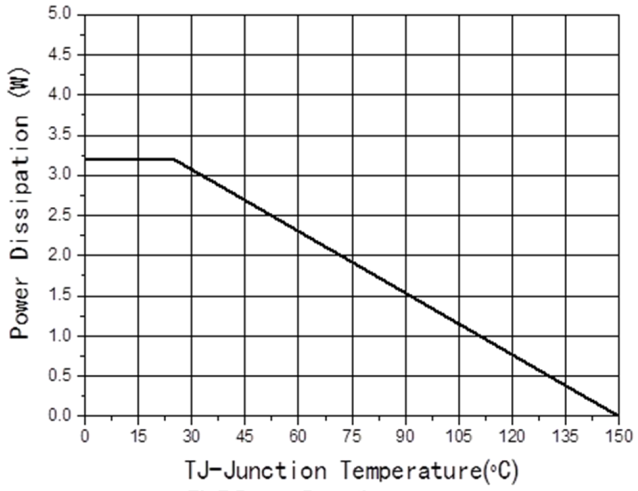


Fig7 Power De-rating

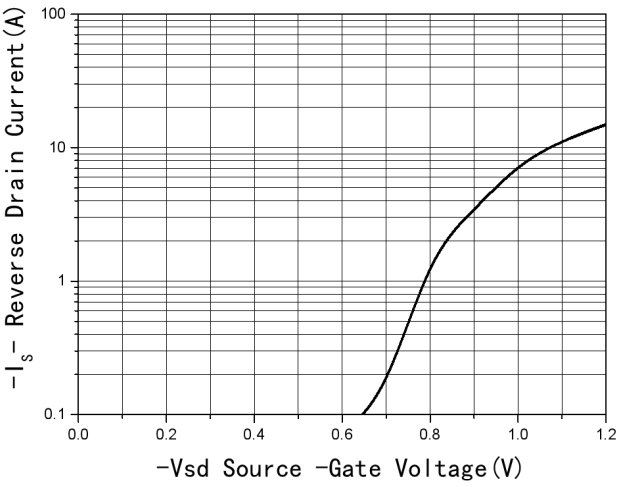
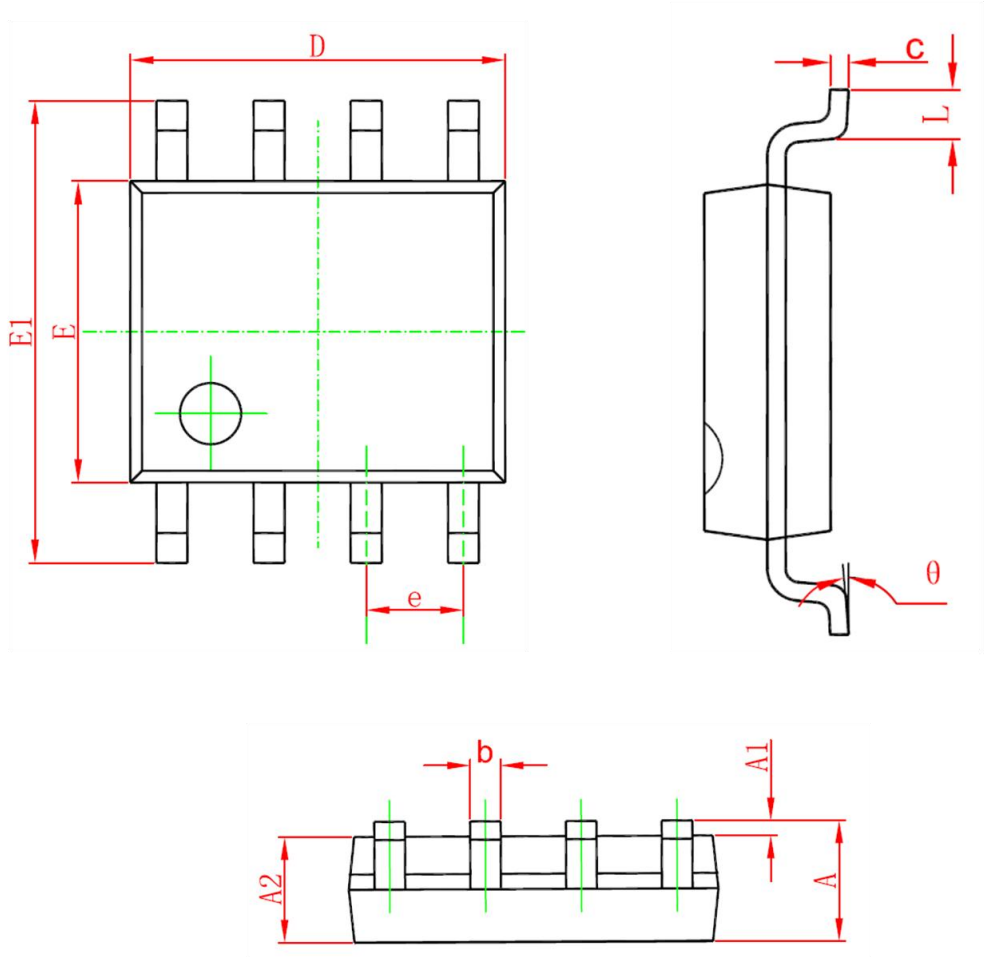


Fig8 Source-Drain Diode Forward

Package Information

- **SOP-8**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°