30V N-Channel Enhancement Mode MOSFET

Description

The NP4406SR-J uses trench MOSFET technology that is uniquely optimized to provide the most efficient high frequency switching performance. Conduction and switching losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Crss.

General Features

- V_{DS} =30V，I_D =13A
  $R_{DS(ON)}$(Typ.)=8mΩ @V_{GS}=10V
  $R_{DS(ON)}$(Typ.)=11mΩ @V_{GS}=4.5V
- Lead free product is acquired
- Surface mount package

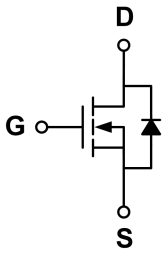
Application

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load switch

Package

- SOP-8

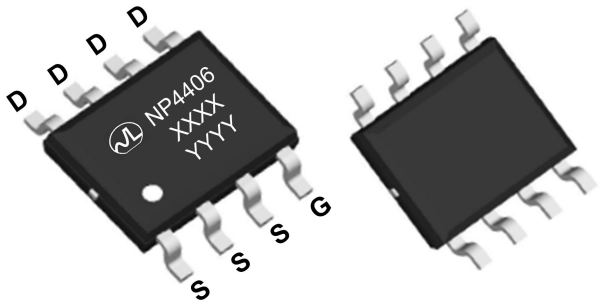
Schematic diagram



Marking and pin assignment

SOP-8

Top View Bottom View



XXXX—Wafer Information

YYYY—Quality Code

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP4406SR-J-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	TC=25°C	I_D	13	A
	TC=70°C		10	
Pulsed Drain Current		I_{DP}	40	A
Avalanche energy(L=0.1mH)		E_{AS}	50	mJ
Power Dissipation	TC=25°C	P_D	3	W
	TC=70°C		2.2	
Operating junction Temperature range		Tj	-55—150	℃

Electrical Characteristics (TA=25℃ 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}=30V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	5	
Gate Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1	1.4	2.5	V
Drain-source on-state resistance[1]	$R_{DS(ON)}$	V_{GS}=10V, I_D=13A	-	8	11	mΩ
		V_{GS}=4.5V, I_D=10A		11	17	
On Status Drain Current	$I_{D(ON)}$	V_{DS}=10V, V_{GS}=5V	40	-	-	A
Diode Characteristics						
Diode Forward Voltage	V_{SD}	I_{SD}=1A,V_{GS}=0V	-	0.78	1.1	V
Diode Continuous Forward Current	I_S		-	-	4	A
Reverse Recovery Time	t_{rr}	I_F=15A, dI/dt=100A/μs	-	28	-	ns
Reverse Recovery Charge	Q_{rr}		-	40	-	nC
Dynamic Characteristics						
Gate Resistance	R_G	V_{GS}=0V, V_{DS}=0V,f=1MHz	-	2.1	-	Ω
Input capacitance	C_{ISS}	V_{GS}=0V ,V_{DS}=15V f=1.0MHz	-	844	-	pF
Output capacitance	C_{OSS}		-	116	-	
Reverse transfer capacitance	C_{RSS}		-	82	-	
Turn-on delay time	$t_{D(ON)}$	V_{GS}=10V, V_{DS}=15V, R_L=1Ω, R_G=3Ω	-	4.3	-	ns
Turn-on Rise time	tr		-	9	-	
Turn-off delay time	$t_{D(OFF)}$		-	16	-	
Turn-off Fall time	t_f		-	6	-	
Total gate charge	Q_g	V_{GS}=10V, V_{DS}=15V,I_D=13A	-	15.3	-	nC
Gate-source charge	Q_{gs}		-	2.6	-	
Gate-drain charge	Q_{gd}		-	2.5	-	

Thermal Characteristics

Parameter		Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient[A]	≤ 10s	$R_{θJA}$	34	40	℃/W
Maximum Junction-to-Ambient[A]	Steady-State		57	75	
Maximum Junction-to-Lead[B]	Steady-State	$R_{θJC}$	15	24	

A:The value of $R_{θJA}$ is measured with the device mounted on 1 in^2 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. The current rating is based on the t ≤ 10s thermal resistance rating.

B: The $R_{θJA}$ is the sum of the thermal impedence from junction to lead $R_{θJC}$ and lead to ambient.

Typical Performance Characteristics

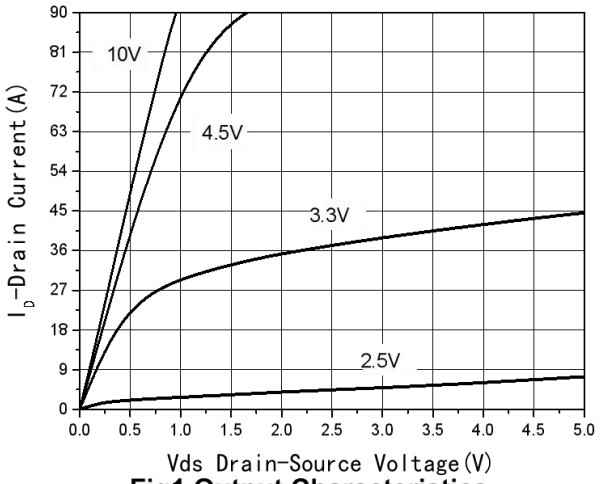


Fig1 Output Characteristics

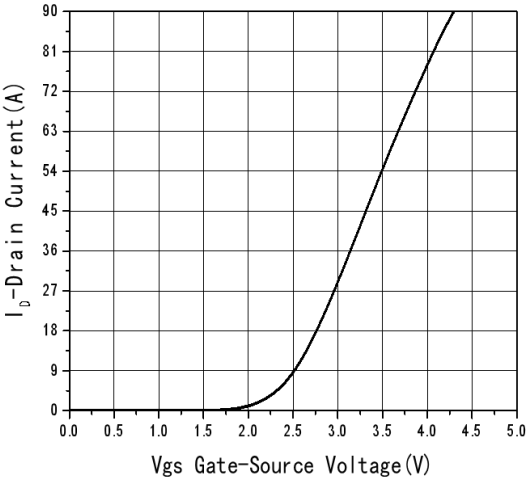


Fig2 Transfer Characteristics

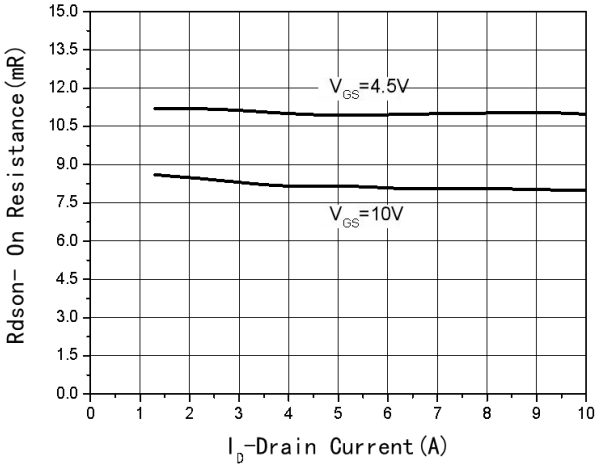


Fig3 Rdson-Drain current

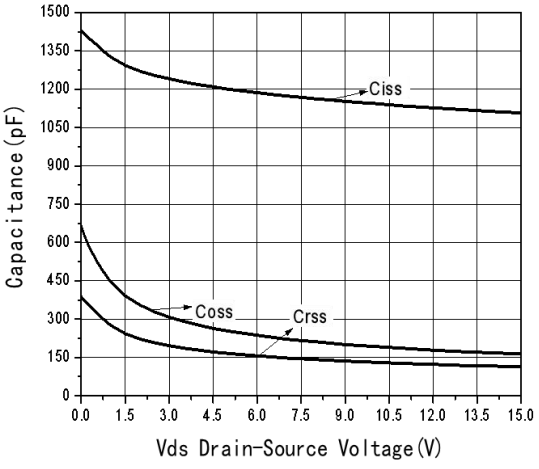


Fig4 Capacitance vs Vds

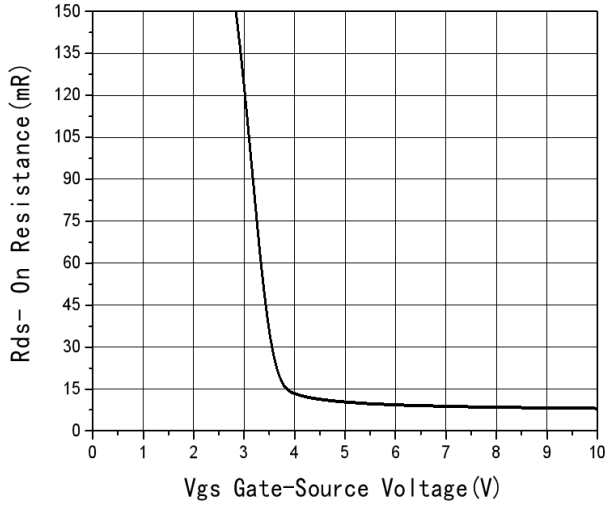


Fig5 Rdson-Gate Drain voltage

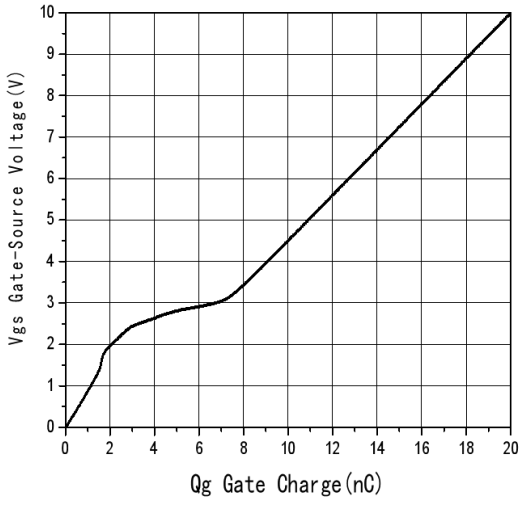


Fig6 Gate Charge

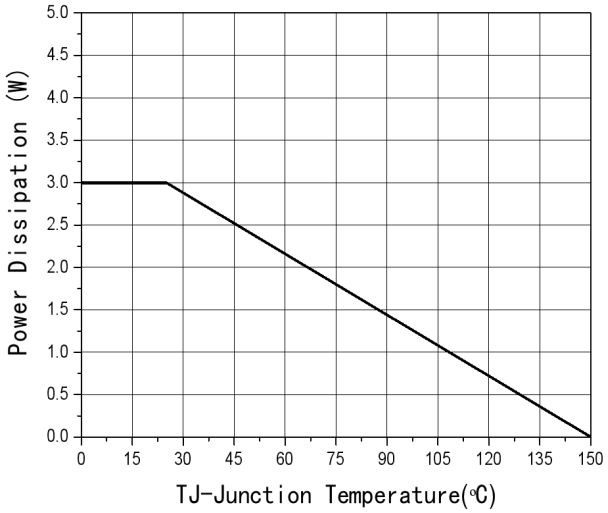


Fig7 Power De-rating

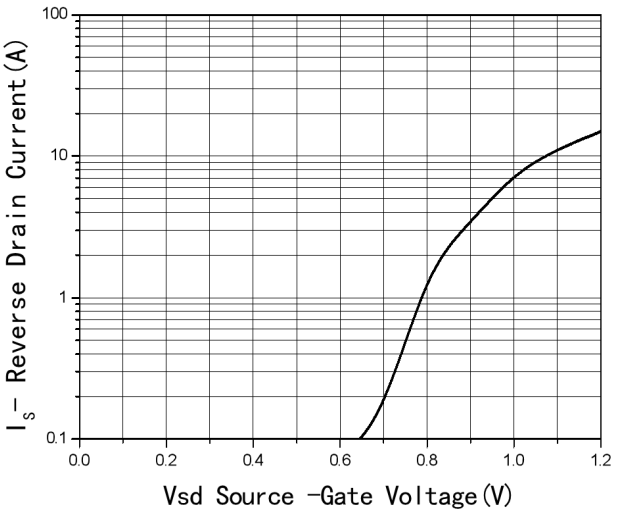
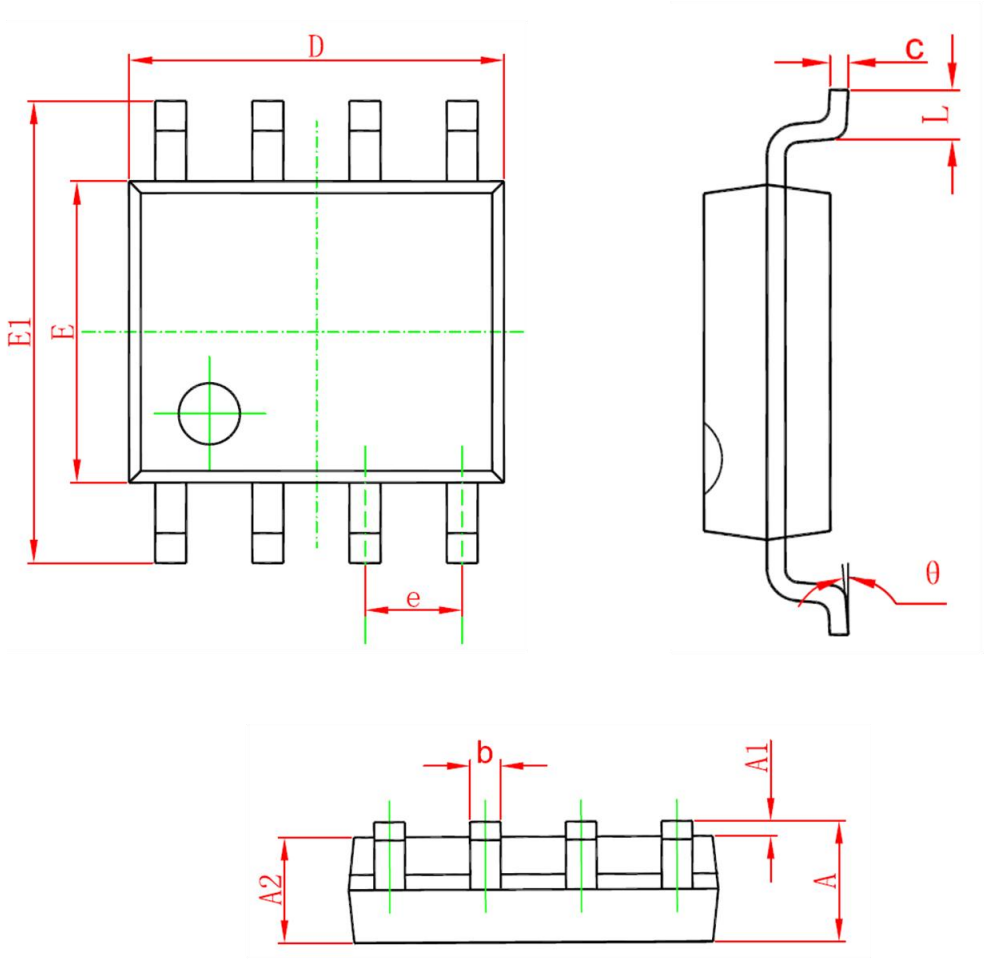


Fig8 Source-Drain Diode Forward

Package Information

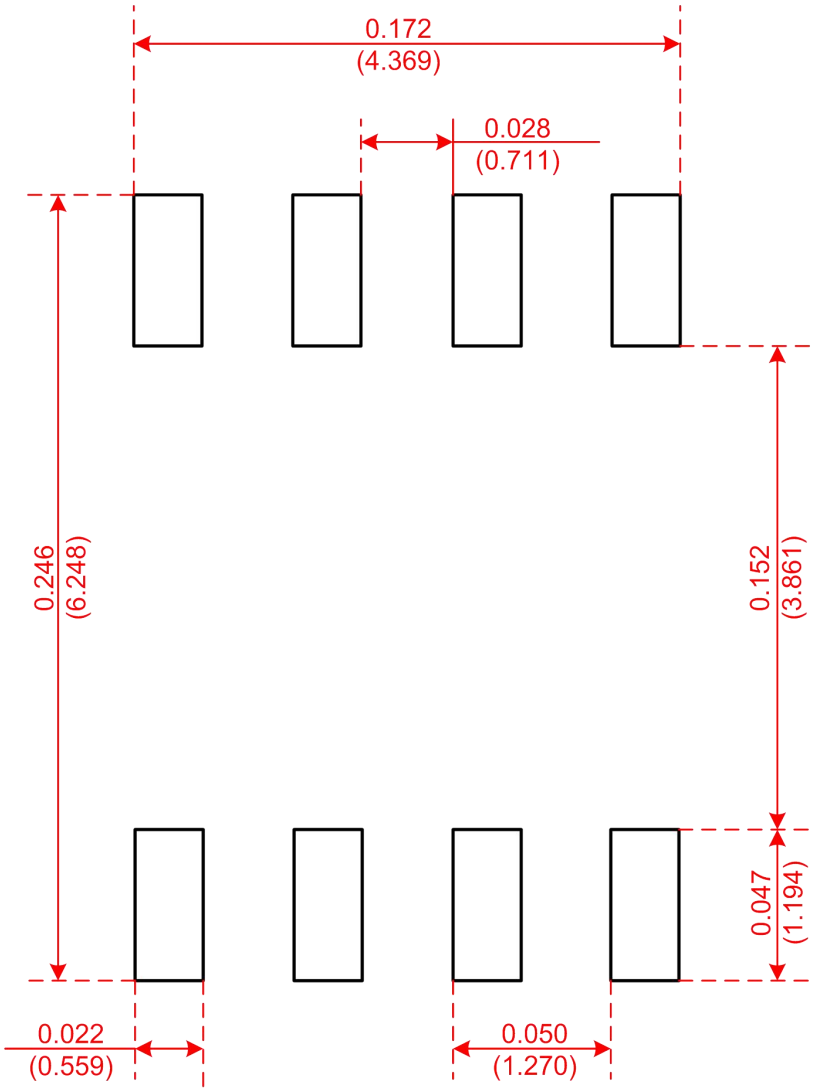
- **SOP-8**



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°

Recommended Minimum Pads

- **SOP-8**



Recommended Minimum Pads
Dimensions in Inches/(mm)