

Description

The ENP4009 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 C_{rss} .

General Features

- $V_{DS} = 40V$, $I_D = 10A$
 $R_{DS(ON)}(Typ.) = 12m\Omega$ @ $V_{GS} = 10V$
 $R_{DS(ON)}(Typ.) = 14m\Omega$ @ $V_{GS} = 4.5V$
- Lead free product is acquired
- Surface mount package

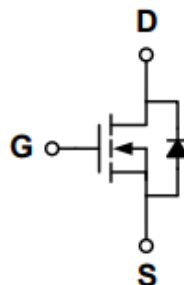
Application

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

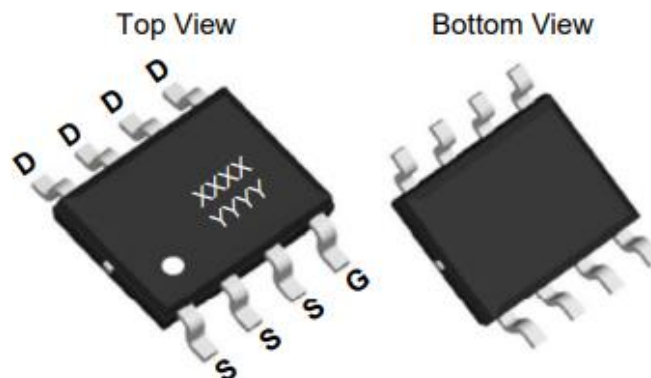
Package

- SOP-8

Schematic diagram



Marking and pin assignment SOP-8





Ordering Information

ENP4009 XX GR

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M1=SOP-8

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	40	V
Gate-source voltage		V_{GS}	±20	V
Continuous Drain Current	TC=25 °C	I_D	10	A
	TC=70 °C		7	
Pulsed Drain Current		I_{DP}	30	A
Avalanche energy(L=0.1mH)		E_{AS}	20	mJ
Power Dissipation	TC=25 °C	P_D	3	W
	TC=70 °C		2.1	
Operating junction Temperature range		T_J	-55—150	°C

Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V$ $T_J=85^\circ C$	-	-	1	μA
			-	-	5	
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.75	2.3	V
Drain-source on-state resistance ¹	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$	-	12	16	m Ω
		$V_{GS}=4.5V, I_D=10A$	-	14	20	
On Status Drain Current	$I_{D(on)}$	$V_{DS}=10V, V_{GS}=5V$	10	-	-	A
Diode Characteristics						
Diode Forward Voltage	V_{SD}	$I_{SD}=1A, V_{GS}=0V$	-	0.82	1.1	V
Diode Continuous Forward Current	I_S		-	-	10	A
Reverse Recovery Time	t_{rr}	$I_F=10A,$	-	12.5	-	ns
Reverse Recovery Charge	Q_{rr}	$dI/dt=100A/\mu s$	-	3.5	-	nC
Dynamic Characteristics						
Gate Resistance	R_G	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	-	2.2	-	Ω
Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=20V$ $f=1.0MHz$	-	1152	-	pF
Output capacitance	C_{oss}		-	97	-	
Reverse transfer capacitance	C_{rss}		-	84	-	
Turn-on delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=20V, R_L=1\Omega,$ $R_G=3\Omega$	-	4	-	ns
Turn-on Rise time	t_r		-	3	-	
Turn-off delay time	$t_{D(off)}$		-	15	-	
Turn-off Fall time	t_f		-	2	-	
Total gate charge	Q_g	$V_{GS}=10V, V_{DS}=20V, I_D=10A$	-	24.7	-	nC
Gate-source charge	Q_{gs}		-	2.5	-	
Gate-drain charge	Q_{gd}		-	4.2	-	

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	33	40	$^\circ C/W$
Maximum Junction-to-Ambient ^A		59	75	
Maximum Junction-to-Lead ^B	$R_{\theta JC}$	16	24	

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

B: 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

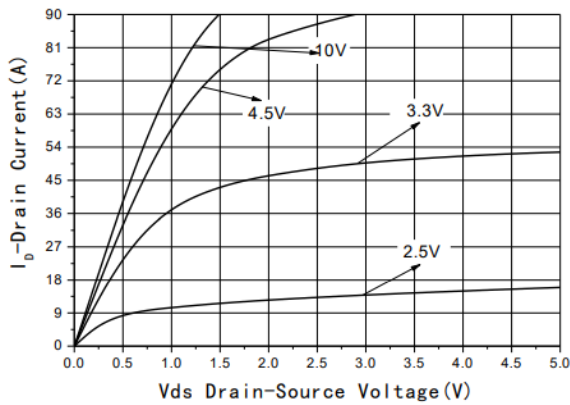


Fig1 Output Characteristics

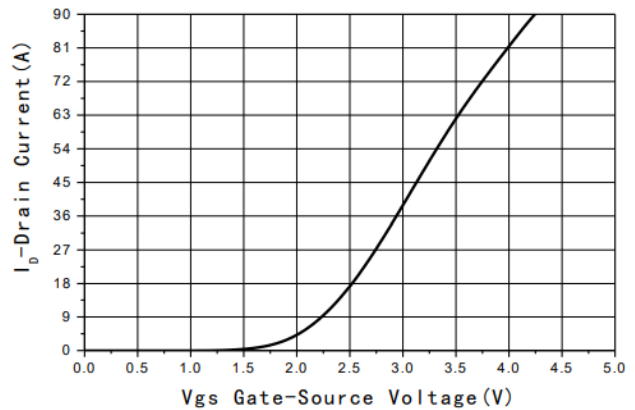


Fig2 Transfer Characteristics

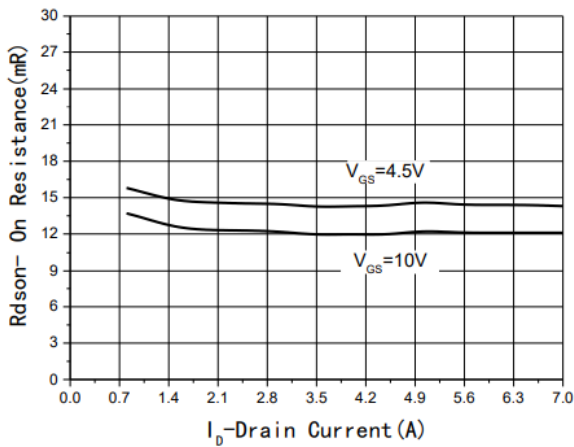
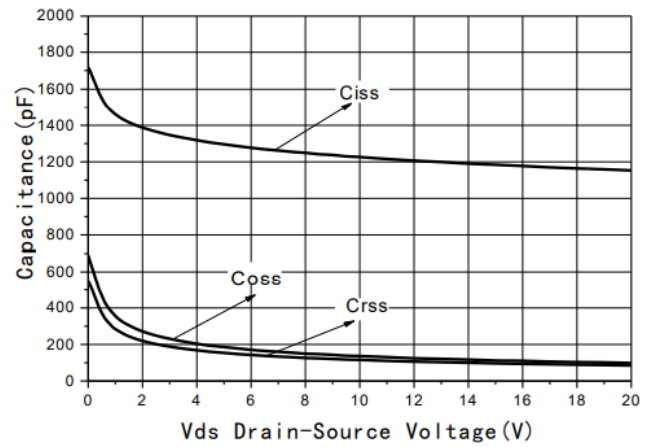
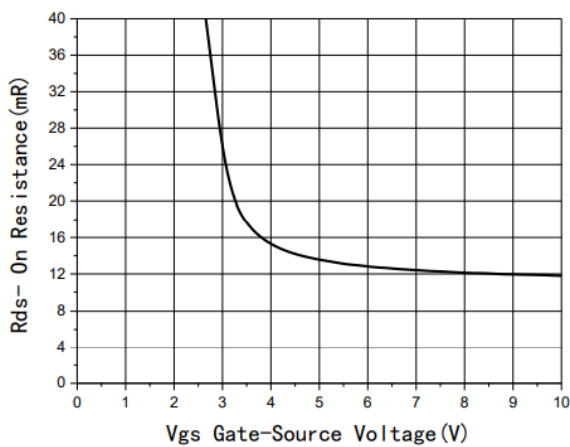
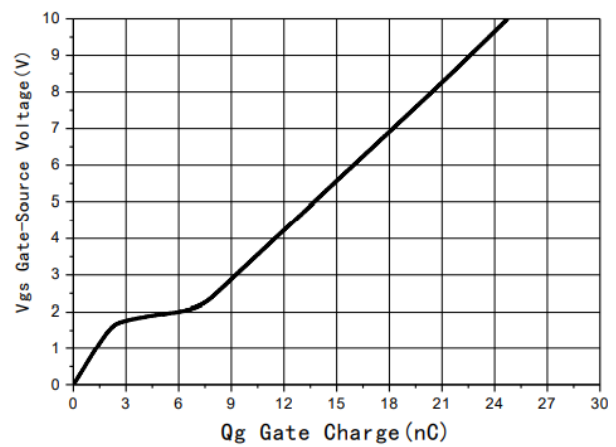

Fig3 $R_{DS(on)}$ -Drain current

Fig4 Capacitance vs V_{DS}

Fig5 $R_{DS(on)}$ -Gate Drain voltage


Fig6 Gate Charge

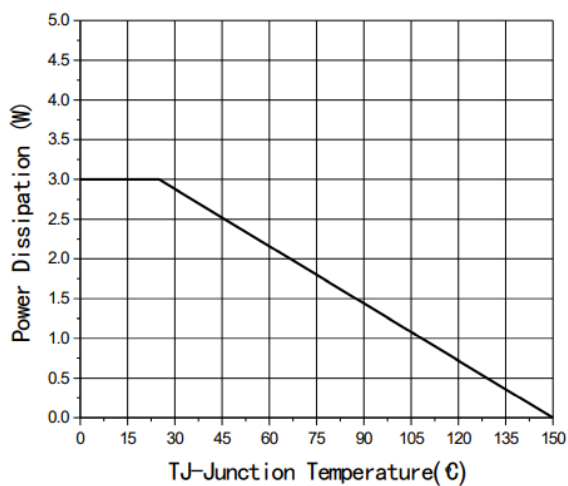


Fig7 Power De-rating

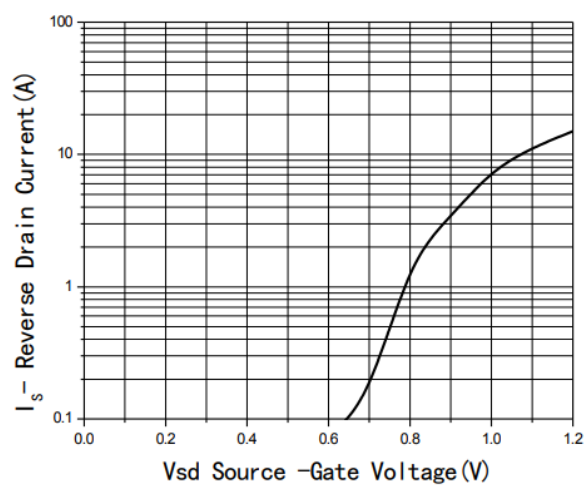
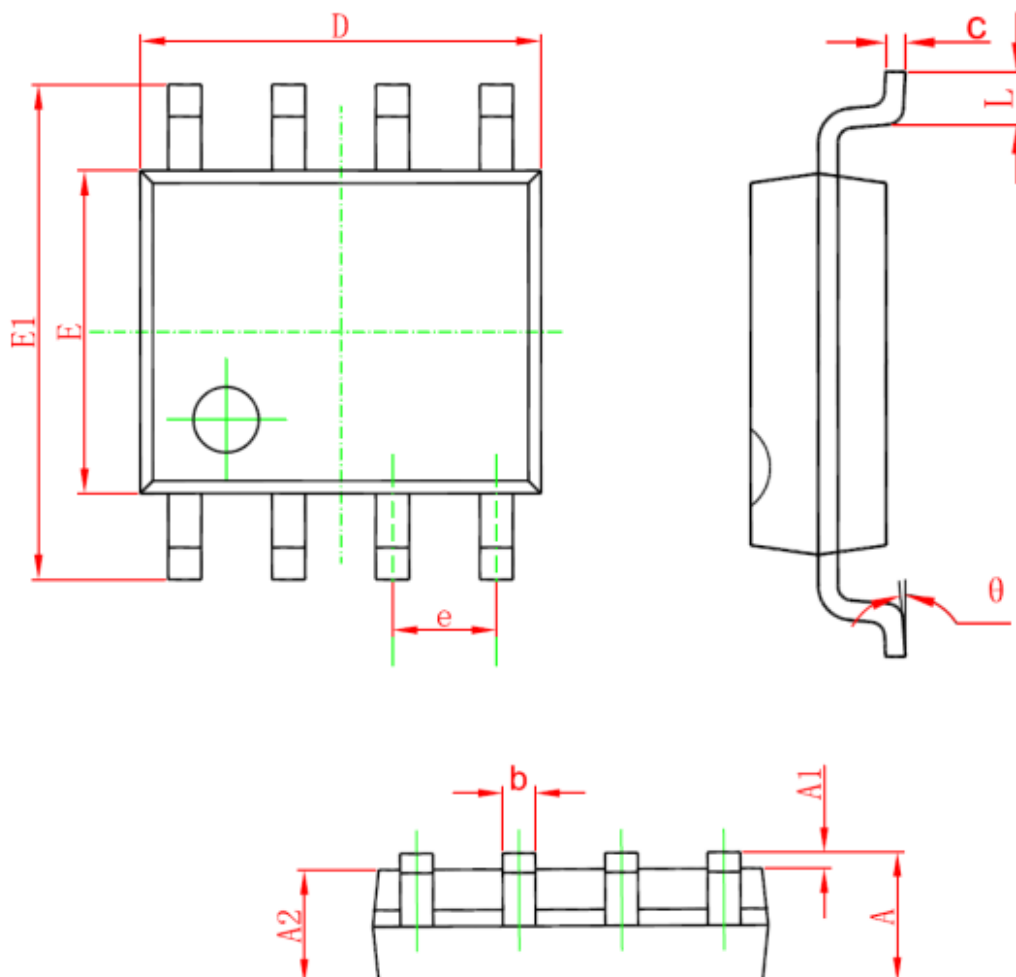


Fig8 Source-Drain Diode Forward

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°