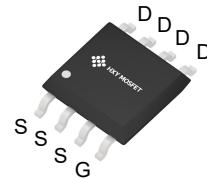




## Description

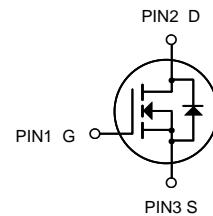
The HXY4009S uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



SOP-8

## General Features

$V_{DS} = 40V$   $I_D = 9A$   
 $R_{DS(ON)} < 16m\Omega$  @  $V_{GS}=10V$   
 $R_{DS(ON)} < 24m\Omega$  @  $V_{GS}=4.5V$



N-Channel MOSFET

## Application

Battery protection  
Load switch  
Uninterruptible power supply

## Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
HXY4009S	SOP-8	4009 XXXX	3000

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

Symbol	Parameter	Limit	Unit
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current-Continuous	9	A
$I_D (70^\circ C)$	Drain Current-Continuous( $T_c=70^\circ C$ )	6.4	A
$I_{DM}$	Pulsed Drain Current	40	A
$P_D$	Maximum Power Dissipation		W
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 To 150	$^\circ C$



**Electrical Characteristics Ta = 25°C**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	VB <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	40	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b> <sup>(Note 3)</sup>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.5	2.0	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =8A	-	12	16	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A	-	19	24	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =8A	33	-	-	S
<b>Dynamic Characteristics</b> <sup>(Note 4)</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, F=1.0MHz	-	964	-	PF
Output Capacitance	C <sub>oss</sub>		-	109	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	96	-	PF
<b>Switching Characteristics</b> <sup>(Note 4)</sup>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =20V, R <sub>L</sub> =2.5Ω V <sub>GS</sub> =10V, R <sub>GEN</sub> =3Ω	-	5.5	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	14	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	24	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	12	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =20V, I <sub>D</sub> =8A, V <sub>GS</sub> =10V	-	22.9	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	3.5	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	5.3	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note 3)</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =9A	-	0.8	1.2	V



### Typical Electrical and Thermal Characteristics

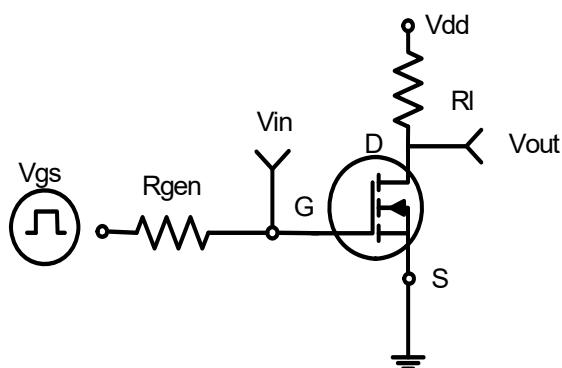


Figure 1:Switching Test Circuit

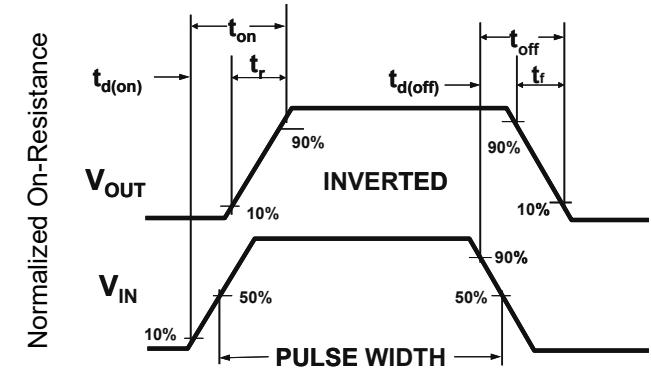


Figure 2:Switching Waveforms

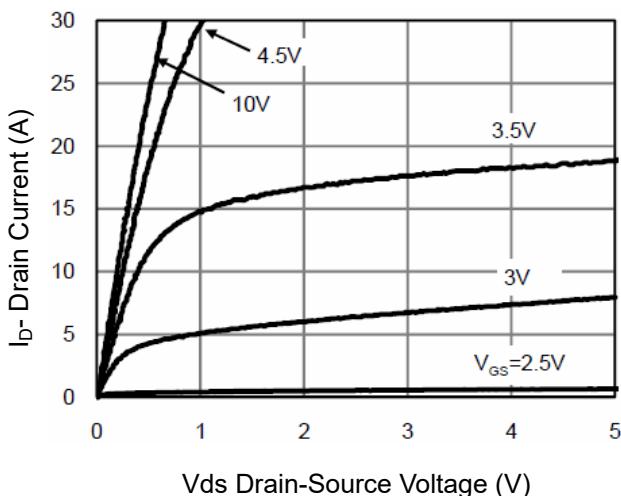


Figure 3 Output Characteristics

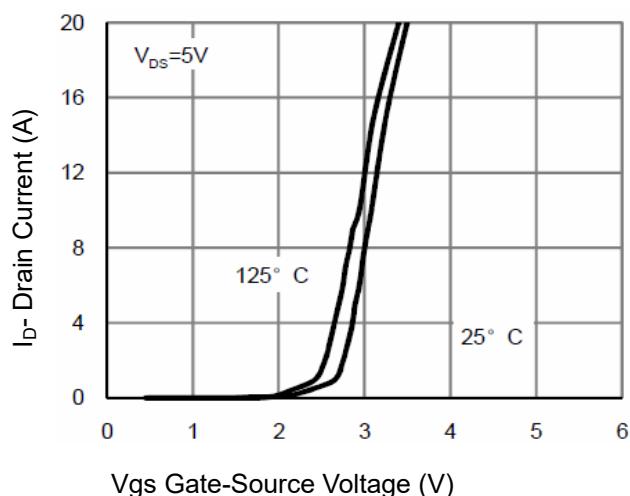


Figure 4 Transfer Characteristics

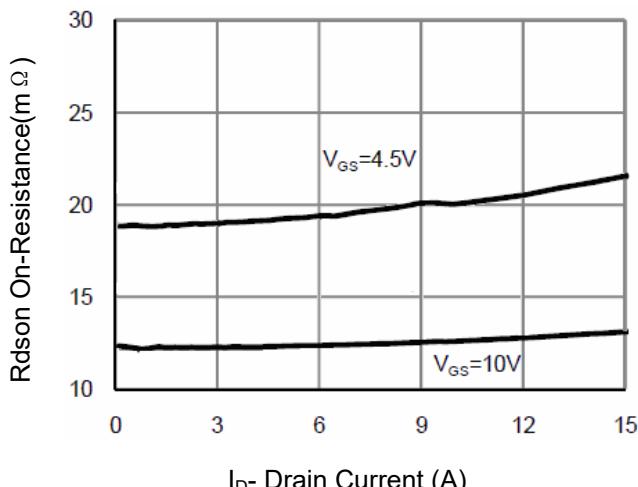


Figure 5 Drain-Source On-Resistance

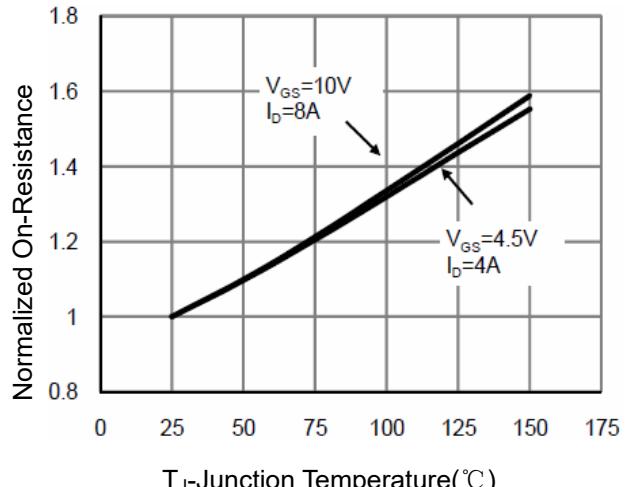
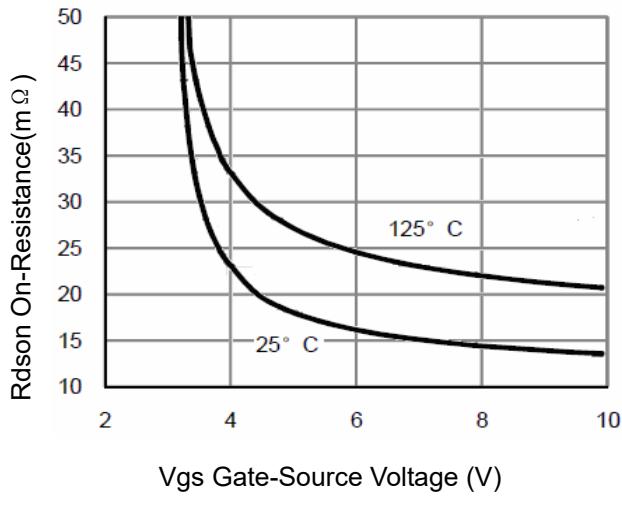
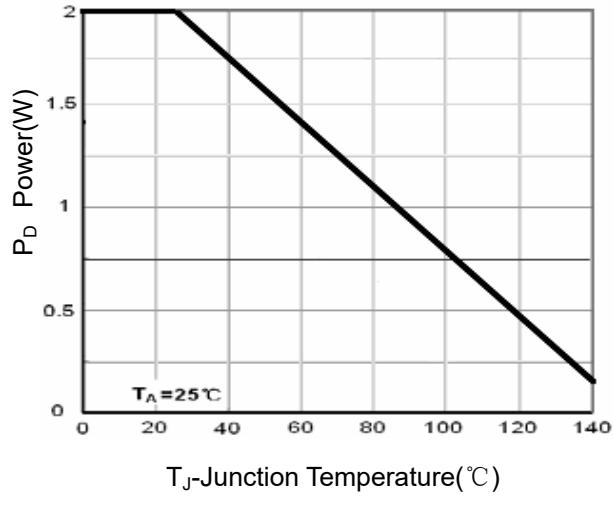


Figure 6 Drain-Source On-Resistance



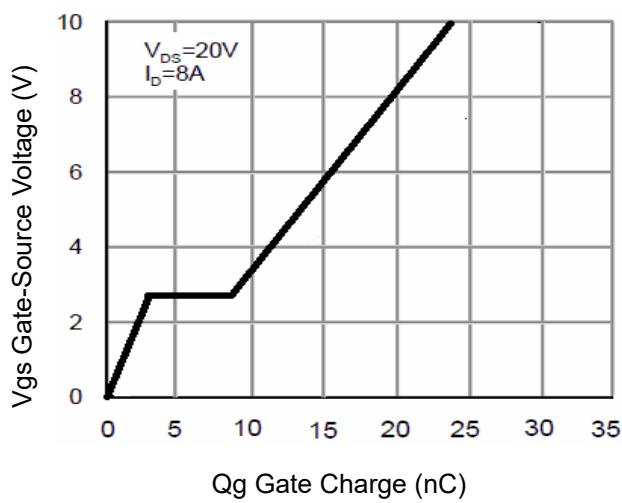
V<sub>gs</sub> Gate-Source Voltage (V)

Figure 7 Rdson vs Vgs



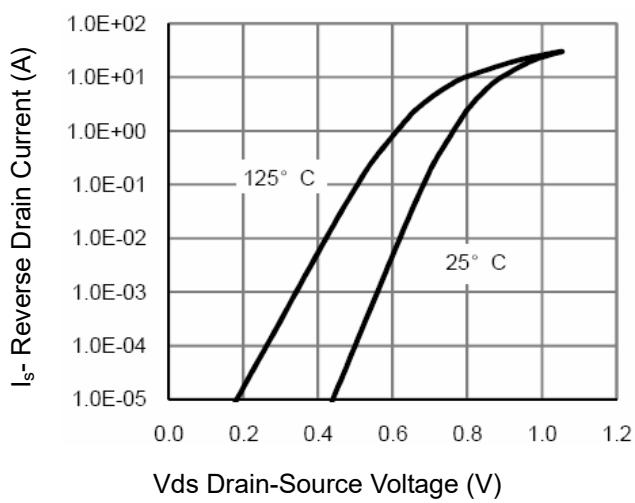
T<sub>J</sub>-Junction Temperature (°C)

Figure 8 Power Dissipation



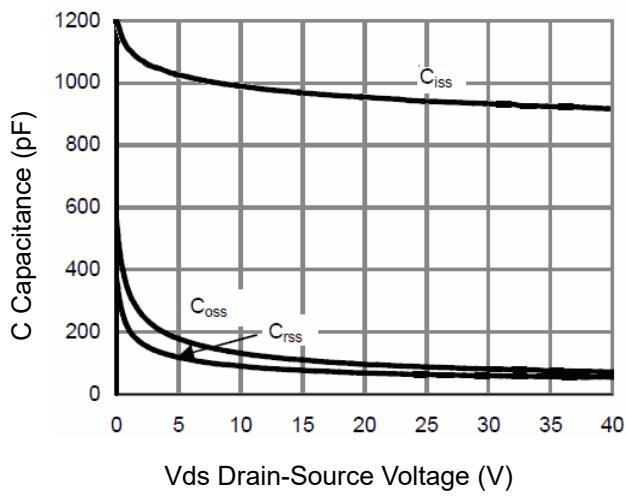
Qg Gate Charge (nC)

Figure 9 Gate Charge



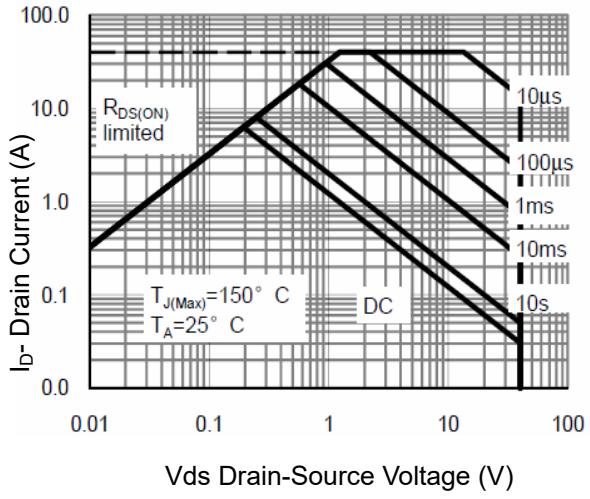
V<sub>ds</sub> Drain-Source Voltage (V)

Figure 10 Source- Drain Diode Forward



V<sub>ds</sub> Drain-Source Voltage (V)

Figure 11 Capacitance vs Vds

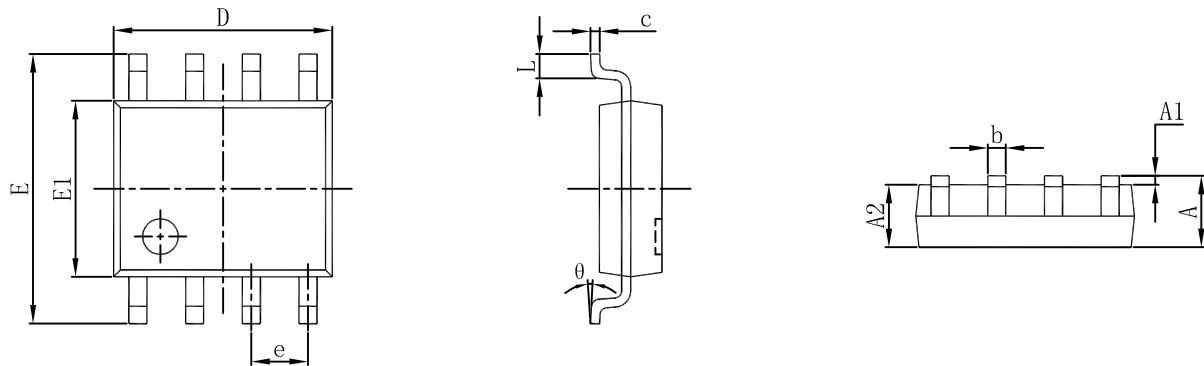


V<sub>ds</sub> Drain-Source Voltage (V)

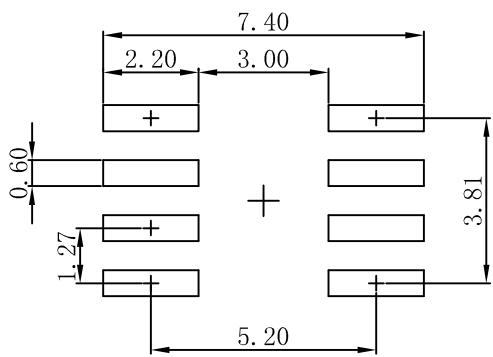
Figure 12 Safe Operation Area



### SOP-8 Package Outline Dimensions



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	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Note:  
1. Controlling dimension: in millimeters.  
2. General tolerance:  $\pm 0.05$ mm.  
3. The pad layout is for reference purposes only.



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