



Description

The HAM7940N 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 Battery protection or in other Switching application.

General Features

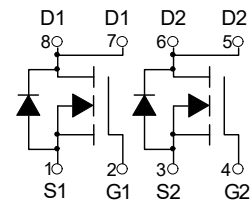
$V_{DS} = 40V$ $I_D = 12A$
 $R_{DS(ON)} < 20m\Omega$ @ $V_{GS}=10V$
 $R_{DS(ON)} < 16m\Omega$ @ $V_{GS}=4.5V$

Application

Battery protection
Load switch
Uninterruptible power supply



SOP-8



Dual N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
HAM7940N	SOP-8	HXY MOSFET	3000

Absolute Maximum Ratings@ $T_J=25^{\circ}C$ (unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_A=25^{\circ}C$	Drain Current, V_{GS} @ 4.5V ³	12	A
$I_D@T_A=70^{\circ}C$	Drain Current, V_{GS} @ 4.5V ³	7	A
I_{DM}	Pulsed Drain Current ¹	40	A
$P_D@T_A=25^{\circ}C$	Total Power Dissipation	2.9	W
T_{STG}	Storage Temperature Range	-55 to 150	$^{\circ}C$
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$
R_{thj-a}	Maximum Thermal Resistance, Junction-ambient ³	65	$^{\circ}C/W$



Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1	1.5	2.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =8A	-	16	20	mΩ
		V _{GS} =4.5V, I _D =4A	-	18.9	24	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =8A	33	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =20V, V _{GS} =0V, F=1.0MHz	-	964	-	PF
Output Capacitance	C _{oss}		-	109	-	PF
Reverse Transfer Capacitance	C _{rss}		-	96	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =20V, R _L =2.5Ω V _{GS} =10V, R _{GEN} =3Ω	-	5.5	-	nS
Turn-on Rise Time	t _r		-	14	-	nS
Turn-Off Delay Time	t _{d(off)}		-	24	-	nS
Turn-Off Fall Time	t _f		-	12	-	nS
Total Gate Charge	Q _g	V _{DS} =20V, I _D =8A, V _{GS} =10V	-	22.9	-	nC
Gate-Source Charge	Q _{gs}		-	3.5	-	nC
Gate-Drain Charge	Q _{gd}		-	5.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =9A	-	0.8	1.2	V



Typical Electrical and Thermal Characteristics (Curves)

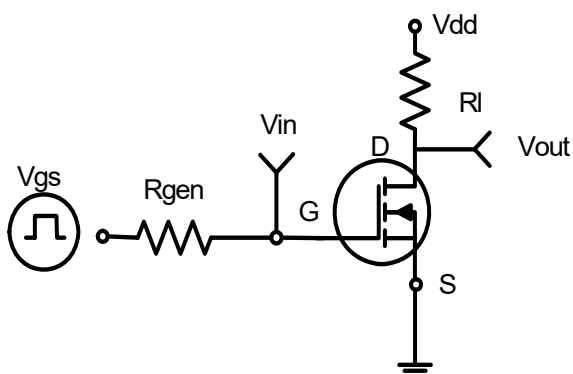


Figure 1: Switching Test Circuit

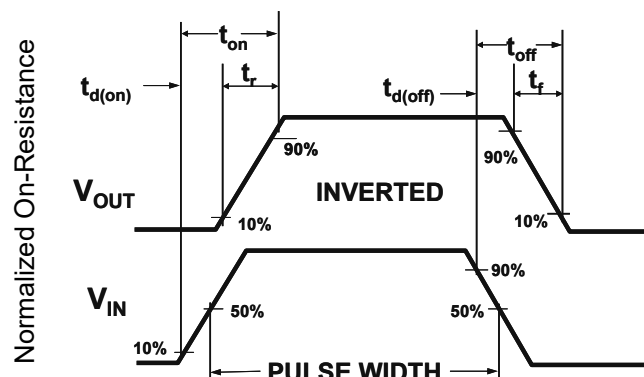


Figure 2: Switching Waveforms

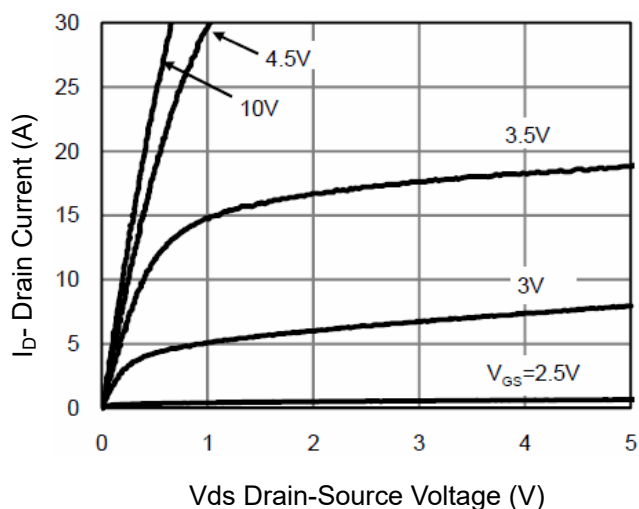


Figure 3 Output Characteristics

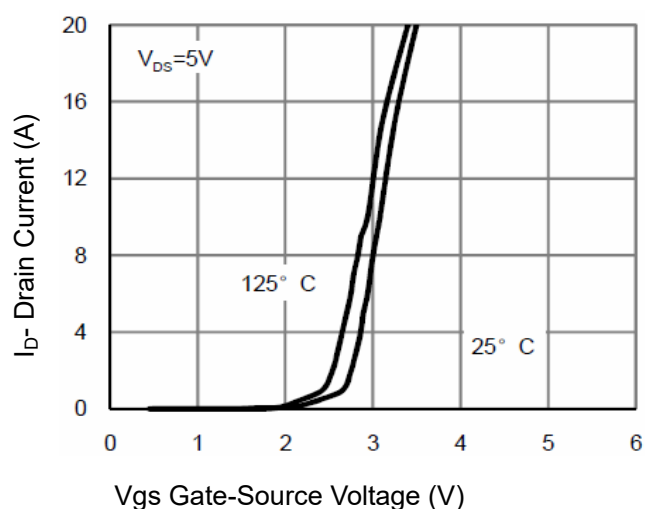


Figure 4 Transfer Characteristics

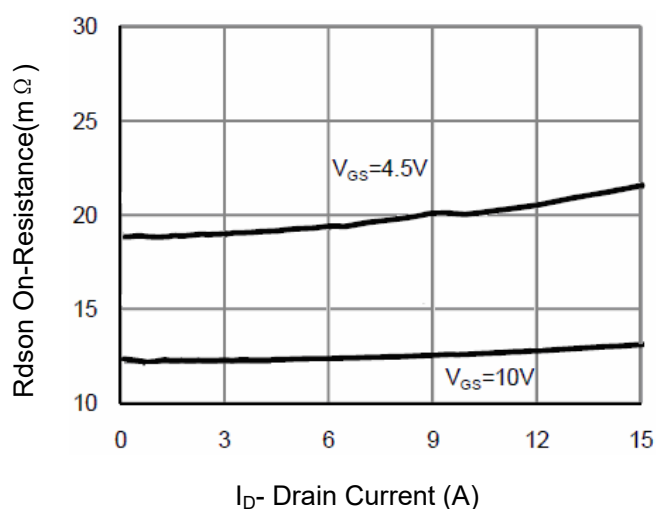


Figure 5 Drain-Source On-Resistance

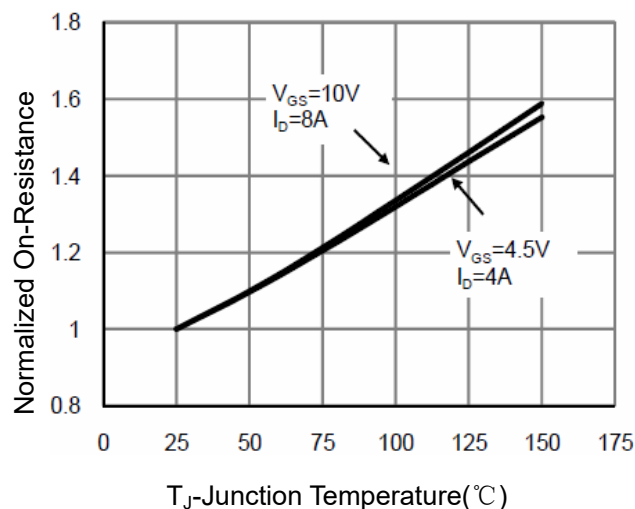
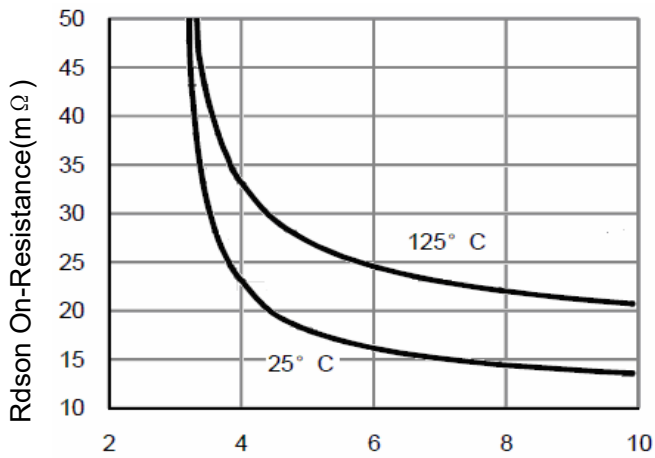
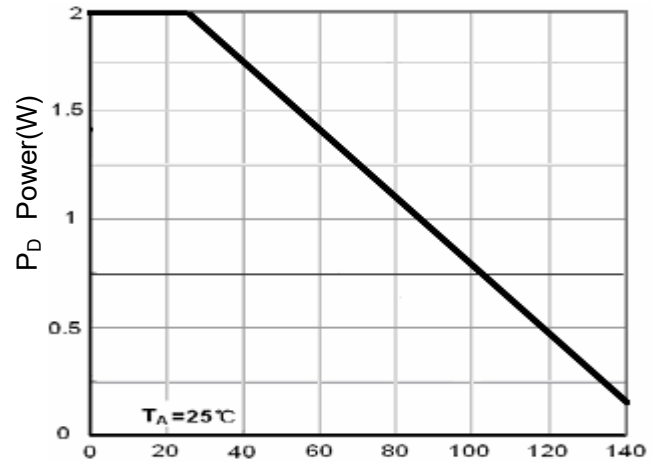


Figure 6 Drain-Source On-Resistance



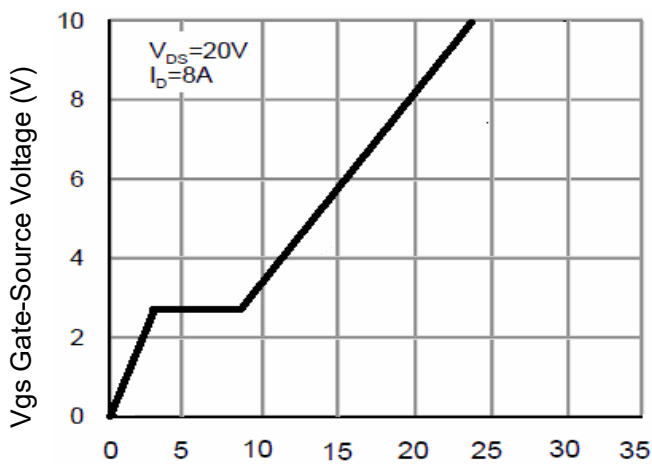
Vgs Gate-Source Voltage (V)

Figure7 Rdson vs Vgs



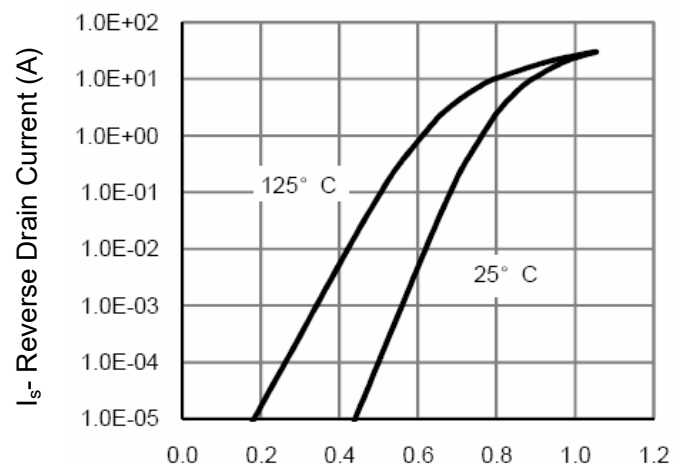
Tj-Junction Temperature(°C)

Figure 8 Power Dissipation



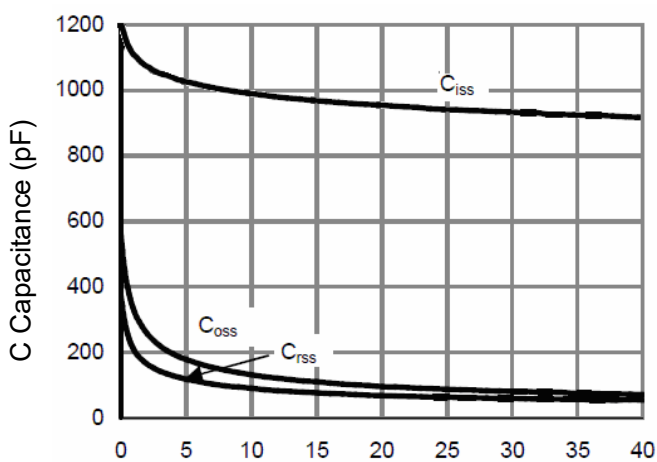
Qg Gate Charge (nC)

Figure 9 Gate Charge



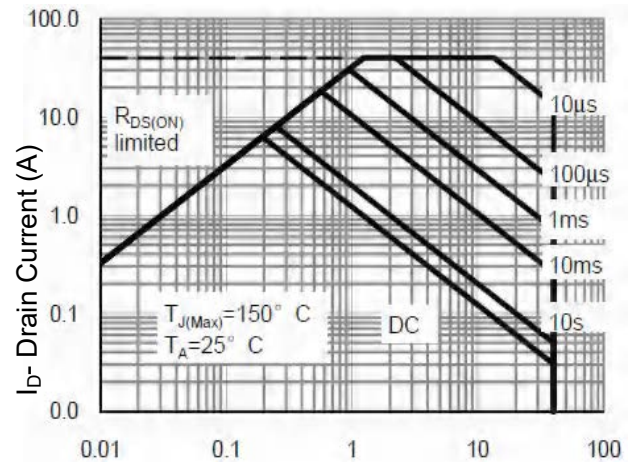
Vds Drain-Source Voltage (V)

Figure 10 Source- Drain Diode Forward



Vds Drain-Source Voltage (V)

Figure 11 Capacitance vs Vds

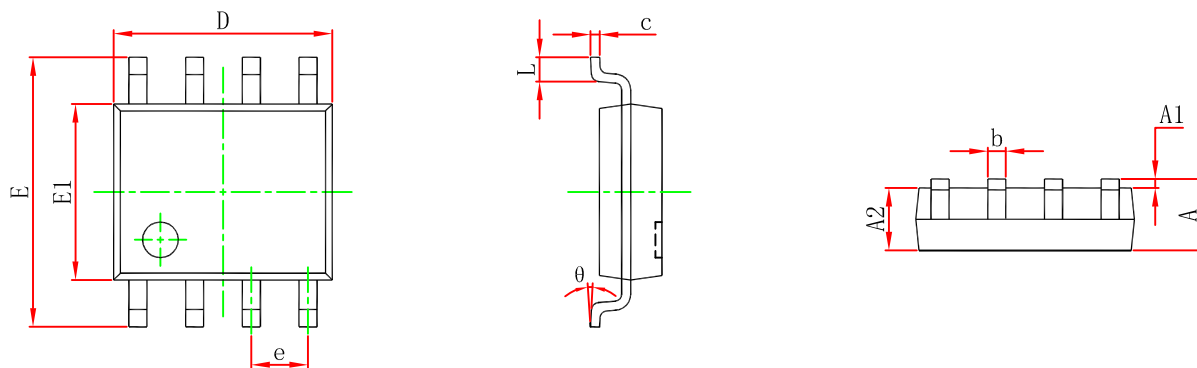


Vds Drain-Source Voltage (V)

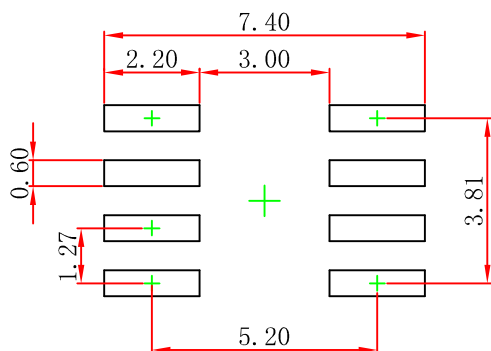
Figure 12 Safe Operation Area



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: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.



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