HC6909

60V P-Channel MOSFET

General Description

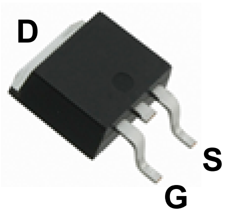
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

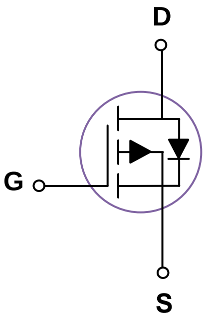
Features

V_{DS}	-60V
I_D (at V_{GS}=-10V)	-12A
$R_{DS(ON)}$ (at V_{GS}=-10V)	85mΩ(Typ)

100% UIS TESTED!
100% ∆Vds TESTED!

TO252





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-60	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current-Continuous	TC=25°C	I_D	-12	A
	TC=100°C	I_D	-7.6	A
Single pulse avalanche energy		E_{AS}	40	mJ
Maximum Power Dissipation		P_D	32	W
Junction and Storage Temperature Range		T_J,T_{STG}	-55 To 150	℃

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance junction-case	$R_{\theta Jc}$		3.8	℃ /W
Thermal Resistance junction-to-Ambient	$R_{\theta JA}$		60	℃ /W

Electrical Characteristics (TJ=25℃ unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=-250μA	-60			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-60V,V_{GS}=0V			1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V,V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=-250μA	-1.0	-1.6	-2.2	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-10V, I_D=-6A		85	100	mΩ
		V_{GS}=-4.5V, I_D=-3A		120	145	mΩ
DYNAMIC PARAMETERS						
C_{Iss}	Input Capacitance	V_{DS}=-30V,V_{GS}=0V , F=1.0MHz		785		pF
C_{oss}	Output Capacitance			175		pF
C_{rss}	Reverse Transfer Capacitance			112		pF
SWITCHING PARAMETERS						
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=-30V,I_D=-1A , V_{GS}=-10V, R_G=6Ω		8		nS
t_r	Turn-on Rise Time			15.4		nS
$t_{d(off)}$	Turn-Off Delay Time			42.8		nS
t_f	Turn-Off Fall Time			8.4		nS
Q_g	Total Gate Charge	V_{DS}=-30V,I_D=-4 A, V_{GS}=-10V		10		nC
Q_{gs}	Gate-Source Charge			1.6		nC
Q_{gd}	Gate-Drain Charge			3		nC
V_{SD}	Diode Forward Voltage	V_{GS}=0V,I_{SD}=-1A		0.72	1.4	V

Note：

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
3. Essentially independent of operating temperature.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

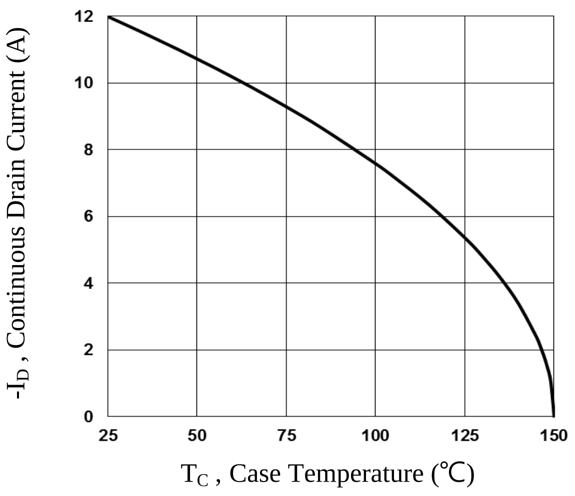


Fig.1 Continuous Drain Current vs. T_C

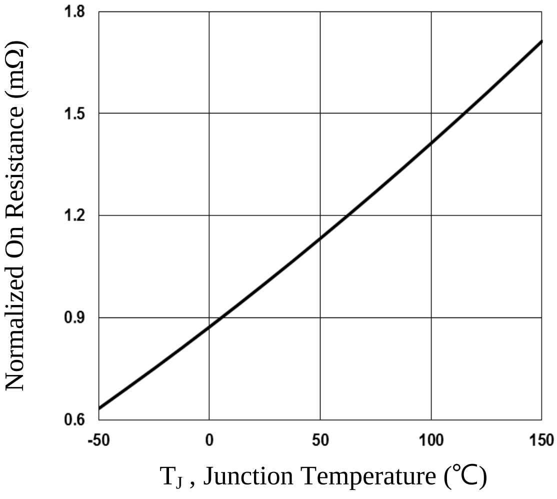


Fig.2 Normalized RDSON vs. T_J

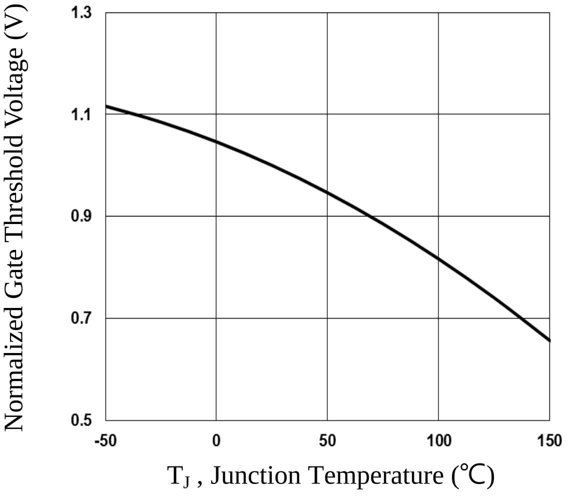


Fig.3 Normalized V_{th} vs. T_J

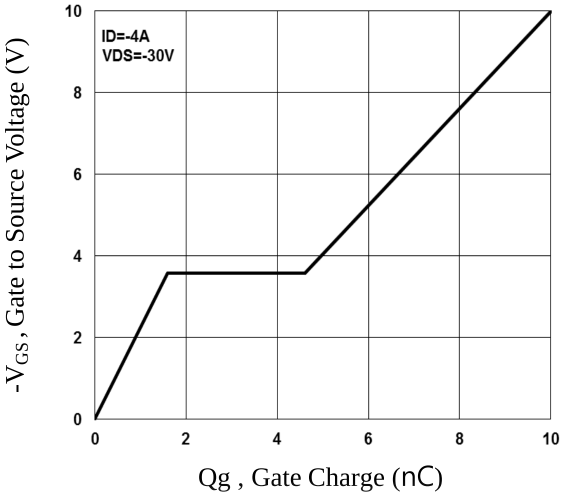


Fig.4 Gate Charge Waveform

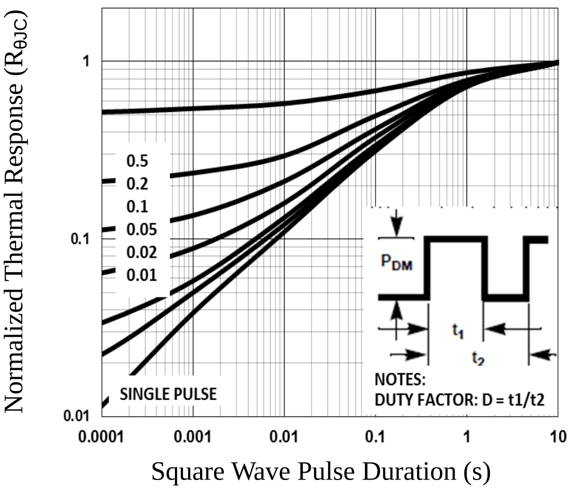


Fig.5Normalized Transient Impedance

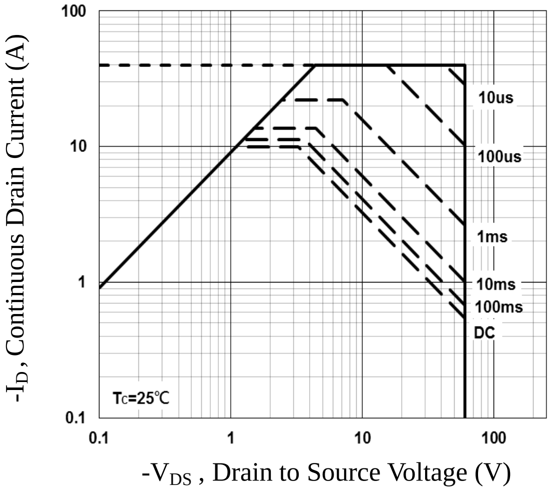


Fig.6 Maximum Safe Operation Area

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

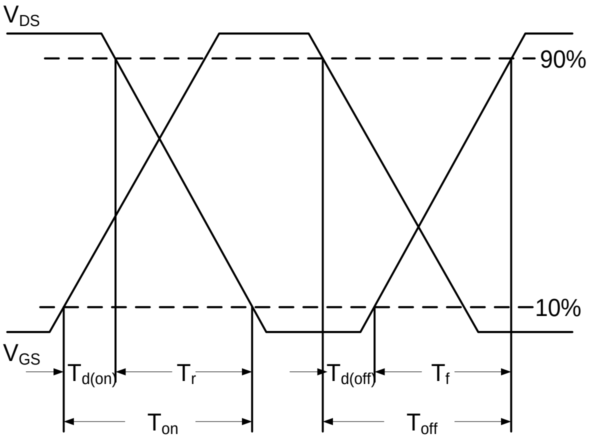


Fig.7 Switching Time Waveform

$$EAS = \frac{1}{2} L \times (-I_{AS})^2 \times \frac{-BVDSS}{-BVDSS-(-VDD)}$$

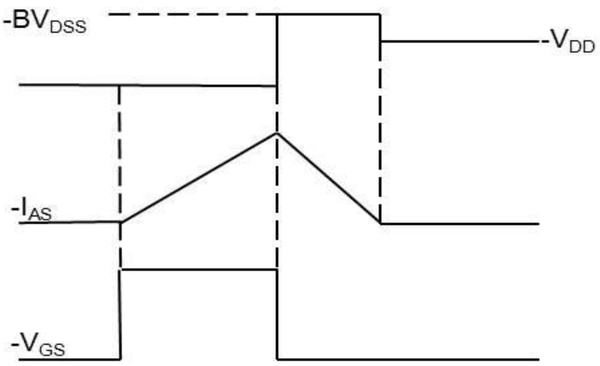
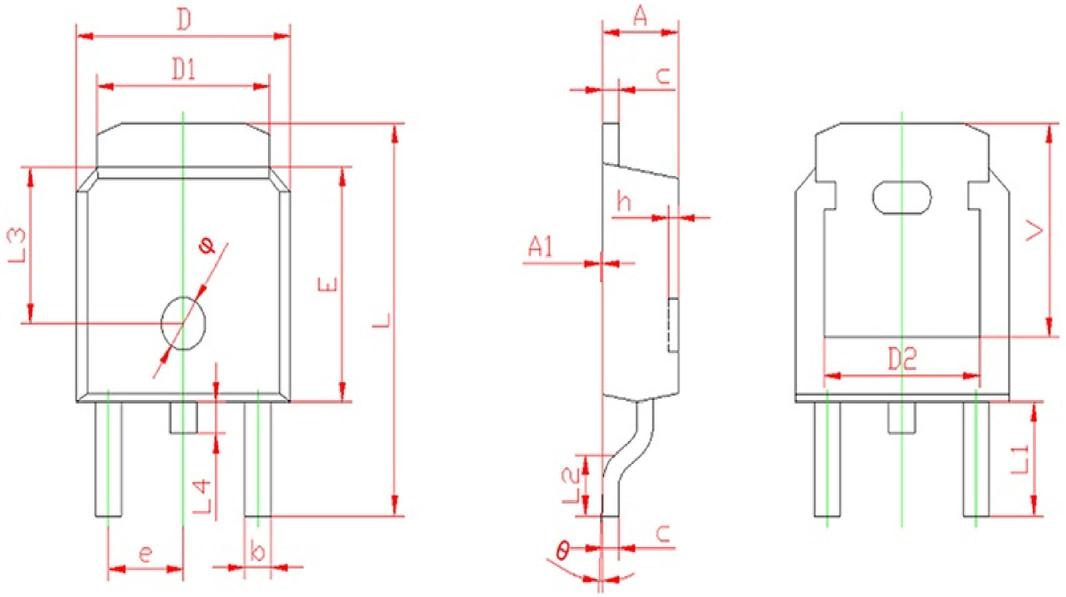


Fig.8 EAS Waveform

TO252 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.800 REF		0.189 REF	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF		0.114 REF	
L2	1.400	1.700	0.055	0.067
L3	4.00 REF		0.157 REF	
L4	0.600	1.000	0.024	0.039
φ	1.200	1.400	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.500 REF		0.217 REF	