杭芯科技
HUTCHIP

HC7002K

60V N-Channel MOSFET

General Description

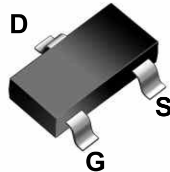
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

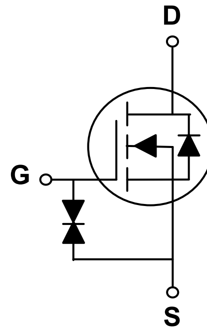
Features

V_{DS}	60V
I_D (at V_{GS}=10V)	0.3A
$R_{DS(ON)}$ (at V_{GS}=10V)	1.7Ω(Typ)

ESD protected

SOT23





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	0.3	A
	TC=100°C	I_D	0.18	A
Drain Current – Pulsed		I_{DM}	1.2	A
Maximum Power Dissipation		P_D	0.35	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 To 150	℃

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance junction-case	$R_{\theta Jc}$		80	℃ /W
Thermal Resistance junction-to-Ambient	$R_{\theta JA}$		125	℃ /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	68		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			±10	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	1.0	1.6	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V, I_D=0.3A		1.7	2.5	Ω
		V_{GS}=4.5V, I_D=0.2A		1.9	3.0	Ω
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{DS}=10V,V_{GS}=0V, F=1.0MHz		30	50	pF
C_{oss}	Output Capacitance			5.5	12	pF
C_{rss}	Reverse Transfer Capacitance			4	8	pF
SWITCHING PARAMETERS						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=30V,I_D=0.2A, V_{GS}=10V, R_G=6Ω		3	7	nS
t_r	Turn-on Rise Time			5	11	nS
$t_{d(off)}$	Turn-Off Delay Time			14	30	nS
t_f	Turn-Off Fall Time			9	20	nS
Q_g	Total Gate Charge	V_{DS}=30V,I_D=0.2A, V_{GS}=10V		1.1	2.0	nC
Q_{gs}	Gate-Source Charge			0.1	1.0	nC
Q_{gd}	Gate-Drain Charge			0.23	1.0	nC
V_{SD}	Diode Forward Voltage	V_{GS}=0V,I_S=1A		0.70	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

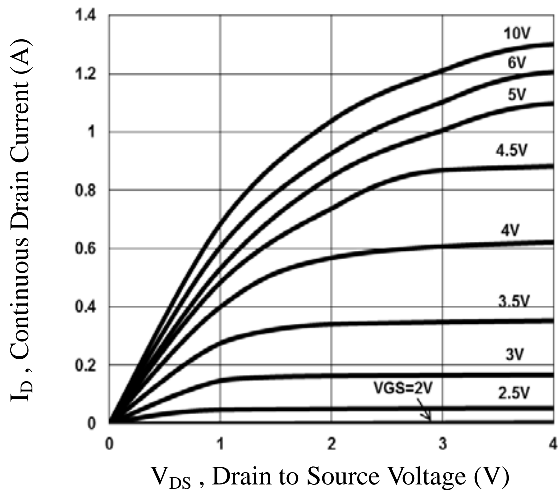


Fig.1 Output Characteristics

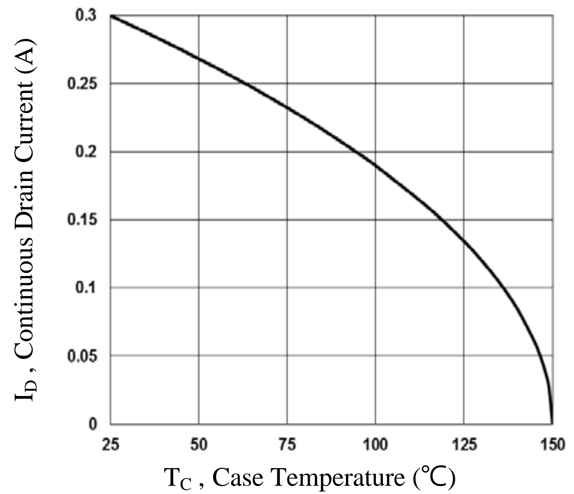


Fig.2 Continuous Drain Current vs. T_C

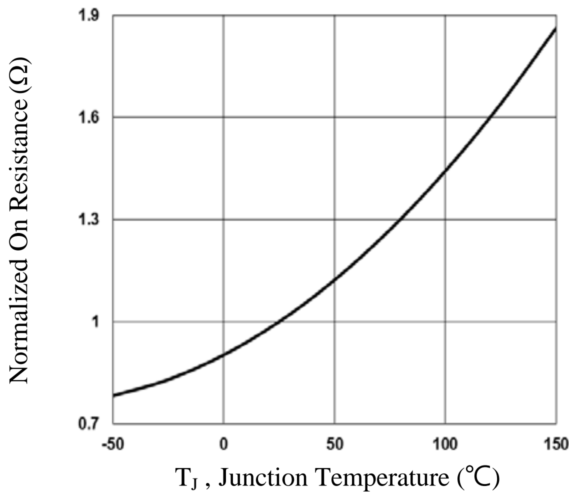


Fig.3 Normalized RDSON vs. T_J

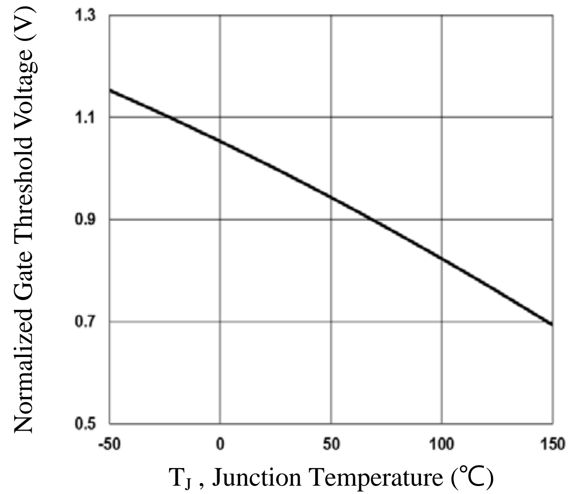


Fig.4 Normalized V_{th} vs. T_J

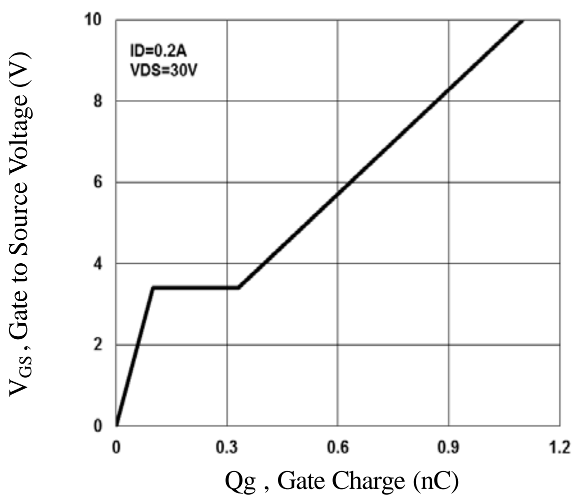


Fig.5 Gate Charge Waveform

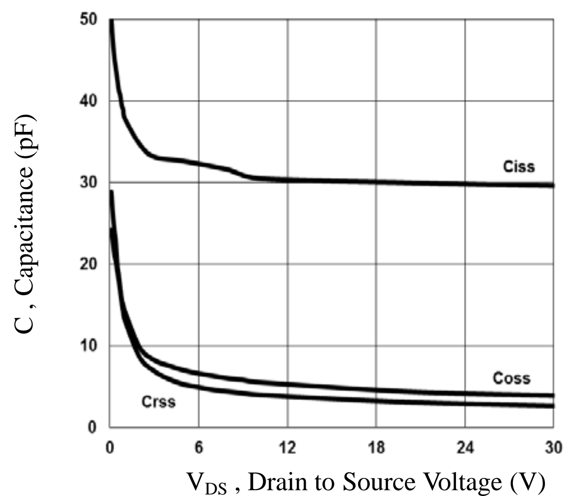


Fig.6 Capacitance Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

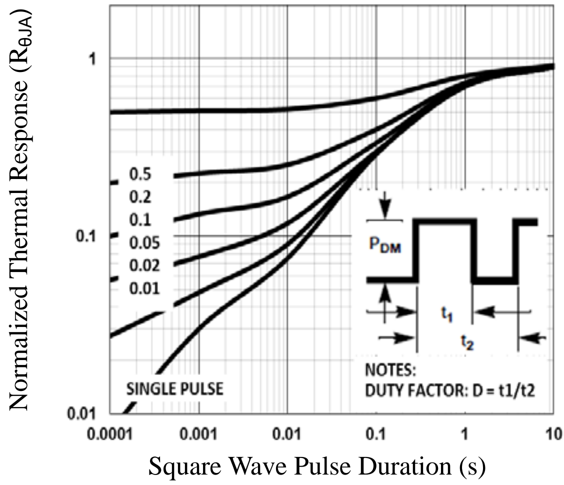


Fig.7 Normalized Transient Impedance

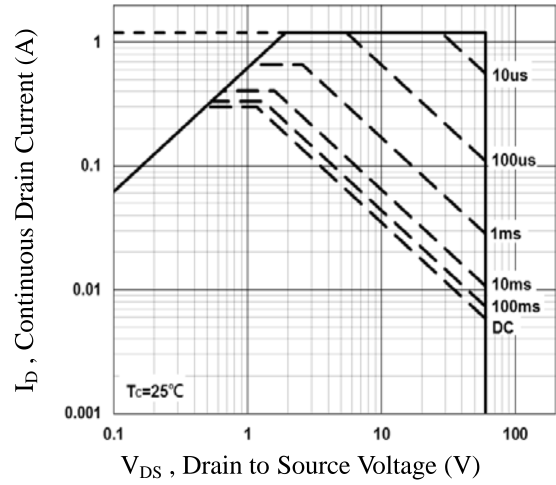


Fig.8 Maximum Safe Operation Area

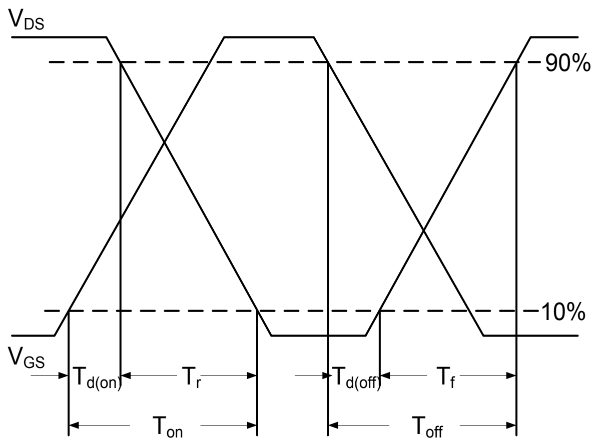


Fig.9 Switching Time Waveform

$$EAS= \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

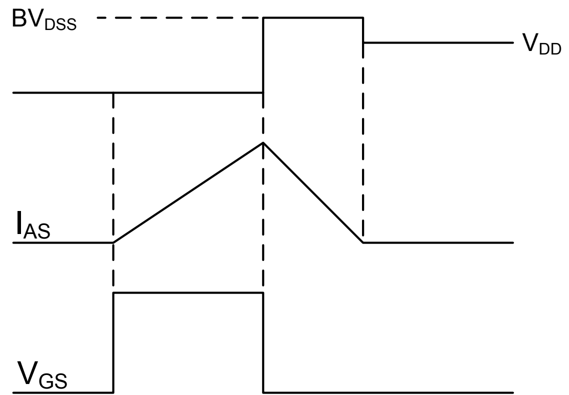
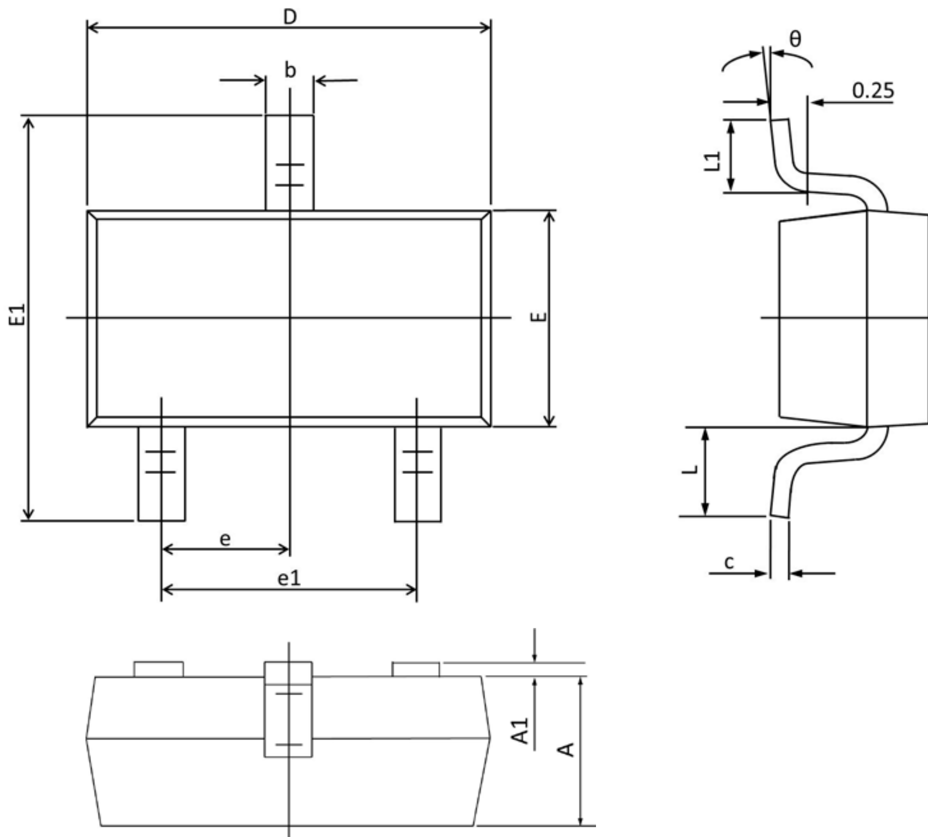


Fig.10 EAS Waveform

SOT23 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.000	0.035	0.039
A1	0.000	0.100	0.000	0.004
b	0.300	0.500	0.012	0.020
c	0.090	0.110	0.003	0.004
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	1°	7°	1°	7°