

## HC2302

### 20V N-Channel MOSFET

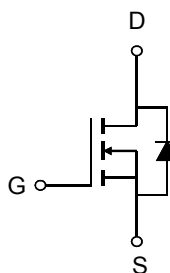
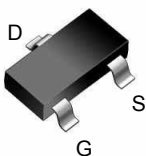
#### General Description

The HC2302 combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ . This device is suitable for use as a load switch or in PWM applications.

#### Features

$V_{DS}$	20V
$I_D$ (at $V_{GS}=4.5V$ )	3.0A
$R_{DS(ON)}$ (at $V_{GS}=4.5V$ )	50mΩ(Max)

SOT23



#### Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

Parameter	Symbol	Maximum	Units	
Drain-Source Voltage	$V_{DS}$	20	V	
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V	
Drain Current-Continuous	TC=25°C	$I_D$	3.0	A
	TC=100°C	$I_D$	1.8	A
Drain Current – Pulsed	$I_{DM}$	-12	A	
Maximum Power Dissipation	$P_D$	0.8	W	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	°C	

#### Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance junction-case	$R_{\theta Jc}$		1.1	°C /W
Thermal Resistance unction-to-Ambient	$R_{\theta JA}$		62	°C /W

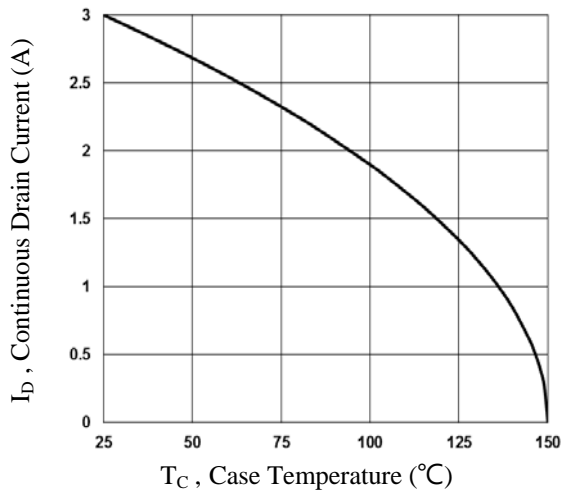
## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	20			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V			1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.5	1.0	1.5	V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =3.0A		40	50	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =2.0A		58	70	mΩ
gfs	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =3A		8		S
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, F=1.0MHz		200		pF
C <sub>OSS</sub>	Output Capacitance			30		pF
C <sub>rSS</sub>	Reverse Transfer Capacitance			26		pF
<b>SWITCHING PARAMETERS</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>GS</sub> =4.5V V <sub>DS</sub> =10V R <sub>G</sub> =25Ω I <sub>D</sub> =3A		1.8		nS
t <sub>r</sub>	Turn-on Rise Time			5.6		nS
t <sub>d(off)</sub>	Turn-Off Delay Time			11.3		nS
t <sub>f</sub>	Turn-Off Fall Time			3.2		nS
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =10V, I <sub>D</sub> =1A, V <sub>GS</sub> =4.5V		3.6		nC
Q <sub>gs</sub>	Gate-Source Charge			0.38		nC
Q <sub>gd</sub>	Gate-Drain Charge			0.6		nC
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>SD</sub> =1A		0.70	1.3	V

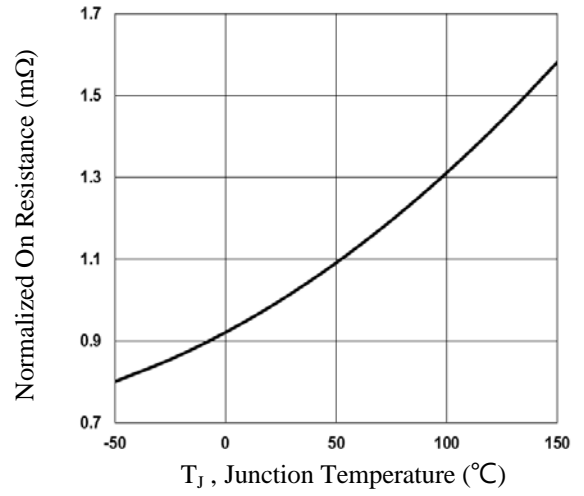
Note:

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.

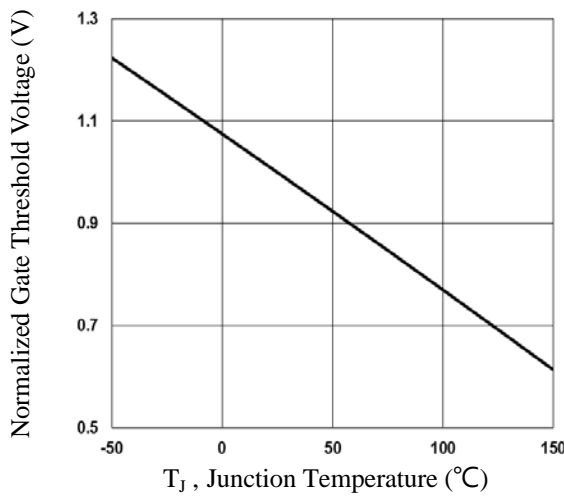
## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



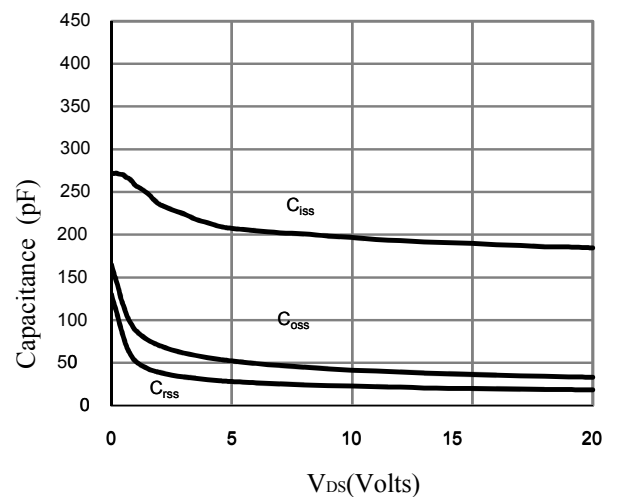
**Fig.1 Continuous Drain Current vs.  $T_c$**



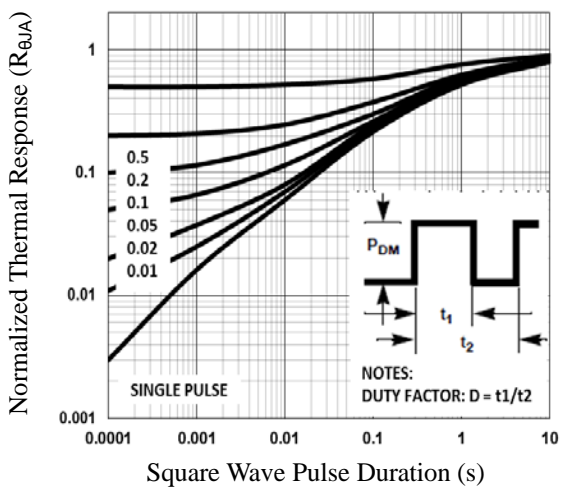
**Fig.2 Normalized RDSON vs.  $T_j$**



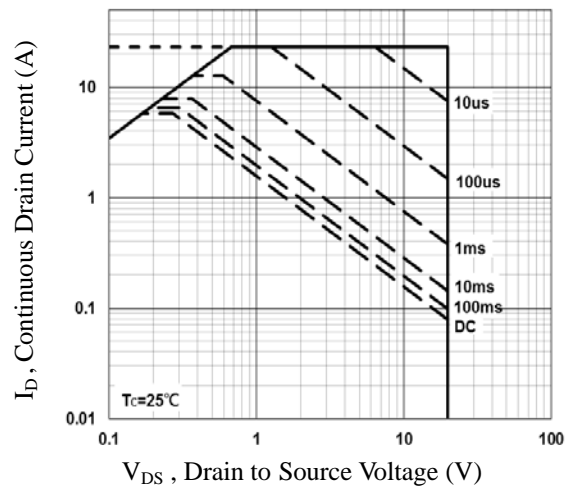
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



**Fig.4 Capacitance Characteristics**



**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

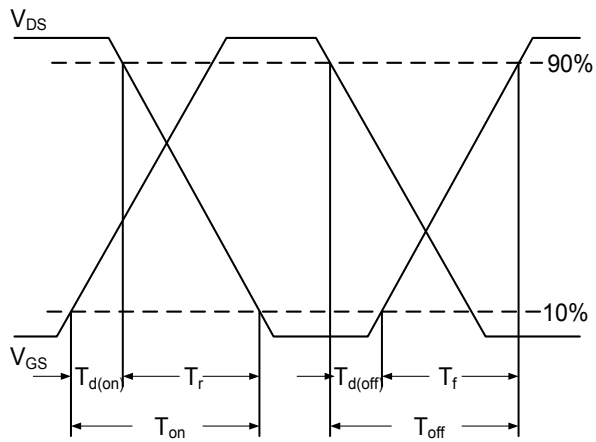


Fig.7 Switching Time Waveform

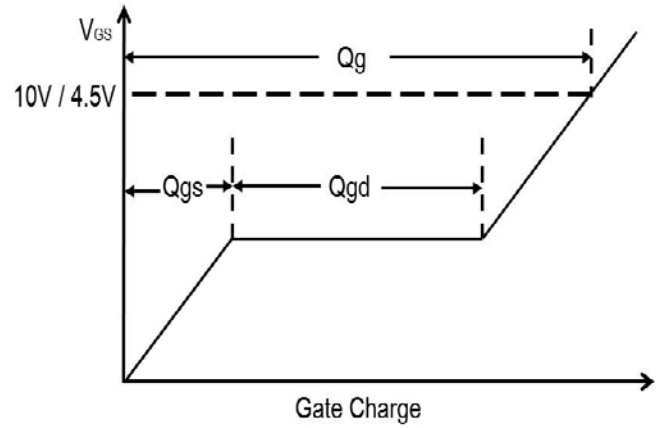
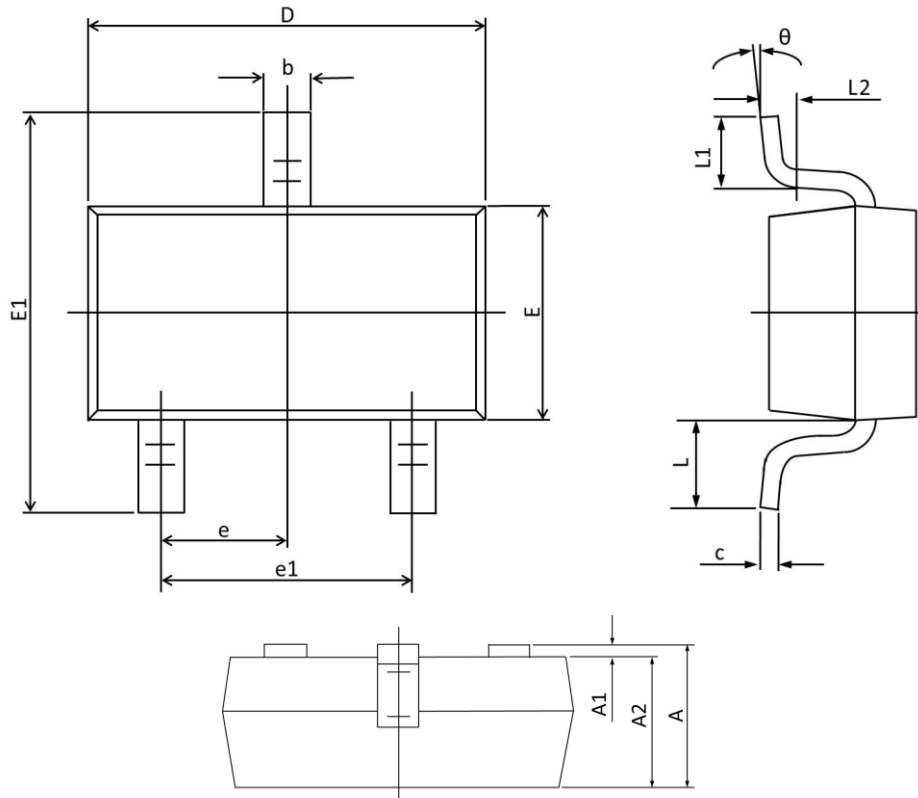


Fig.8 Gate Charge Waveform

SOT23 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Max	Min	Max	Min
A	1.150	0.900	0.045	0.035
A1	0.100	0.000	0.004	0.000
A2	1.050	0.900	0.041	0.035
b	0.500	0.300	0.020	0.012
c	0.150	0.080	0.006	0.003
D	3.000	2.800	0.118	0.110
E	1.400	1.200	0.055	0.047
E1	2.550	2.250	0.100	0.089
e	0.95 TYP.		0.037 TYP.	
e1	2.000	1.800	0.079	0.071
L	0.55 REF.		0.022 REF.	
L1	0.500	0.300	0.020	0.012
L2	0.25 TYP.		0.01 TYP.	
$\theta$	8°	0°	8°	0°