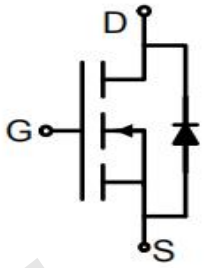
N-Channel Enhancement Mode Power MOSFET

Description

The MX2300C 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 load switch or in PWM applications.



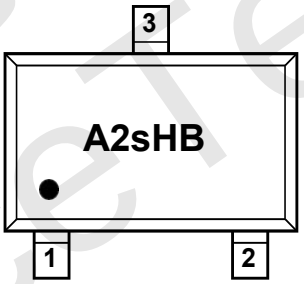
Schematic diagram

General Features

- V_{DS} =20V，I_D =2.5A
- $R_{DS(ON)}$(Typ.) 52mΩ @ Vgs=4.5V
- $R_{DS(ON)}$(Typ.) 72mΩ @ Vgs=2.5V
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

- PWM applications
- Load switch
- Power management



Marking and pin assignment

SOT-23 top view

Absolute Maximum Ratings (TA=25℃ unless otherwise noted)

parameter	symbol	limit	unit
Drain-source voltage	V_{DS}	20	V
Gate-source voltage	V_{GS}	±12	V
Drain current-continuous[a]@Tj=125℃	I_D	2.5	A
-pulse *d*[b]	I_{DM}	5	A
Maximum power dissipation	P_D	0.35	W
Operating junction Temperature range	Tj	-55—150	℃

TEL: +86-0755-27595155 27595165
FAX: +86-0755-27594792
WEB:Http://www.ChipSourceTek.com
E-mail: Sales@ChipSourceTek.com Tony.Wang@ChipSourceTek.com

Electrical Characteristics (TA=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=250μA	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V,V_{GS}=0V	-	-	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±12V,V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	0.5	0.7	1.2	V
g_{FS}	Forward Transconductance	V_{DS}=5V,I_D=2.1A	-	6.5	-	S
$R_{DS(ON}$	Drain-Source On-State Resistance	V_{GS}=4.5V, I_D=2.1A	-	52	70	mΩ
		V_{GS}=2.5V, I_D=2.1A	-	72	95	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=10V,V_{GS}=0V, f=1.0MHz	-	430	-	pF
C_{oss}	Output Capacitance		-	78	-	pF
C_{rss}	Reverse Transfer Capacitance		-	46	-	pF
Switching Times						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=10V,I_D=2.1A,RL=2.8Ω V_{GS}=4.5V,R_G=6Ω	-	11		nS
t_r	Turn-on Rise Time		-	42		nS
$t_{d(off)}$	Turn-Off Delay Time		-	13		nS
t_f	Turn-Off Fall Time		-	10		nS
Q_g	Total Gate Charge	V_{DS}=10V,I_D=3A, V_{GS}=4.5V	-	4		nC
Q_{gs}	Gate-Source Charge		-	0.7	-	nC
Q_{gd}	Gate-Drain Charge		-	1.2	-	nC
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current(Body Diode)		-	-	2.0	A
V_{SD}	Forward on Voltag	V_{GS}=0V,I_S=1A	-	0.75	1.2	V

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	125	℃/W

Notes:

a. surface mounted on FR4 board,t≤10sec
b. pulse test: pulse width≤300μs,duty≤2%
c. guaranteed by design, not subject to production testing

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Typical Performance Characteristics

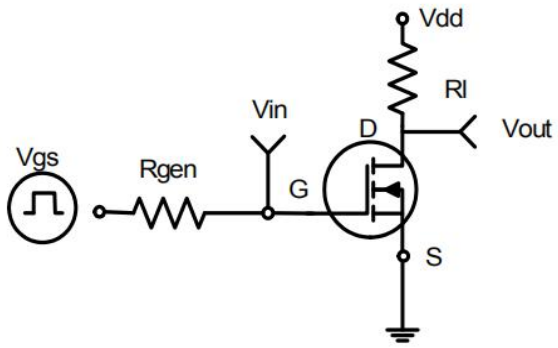


Figure 1:Switching Test Circuit

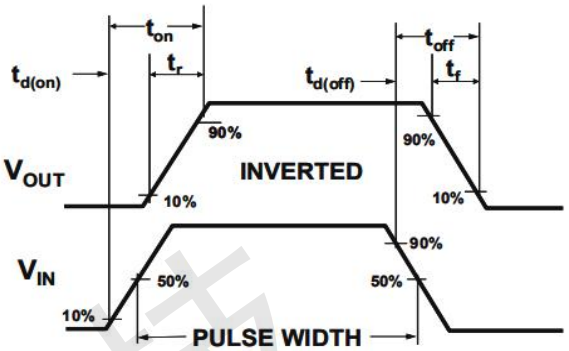


Figure 2:Switching Waveforms

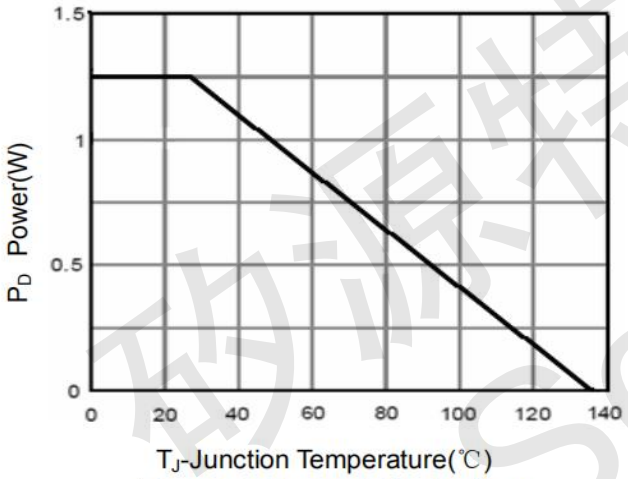


Figure 3 Power Dissipation

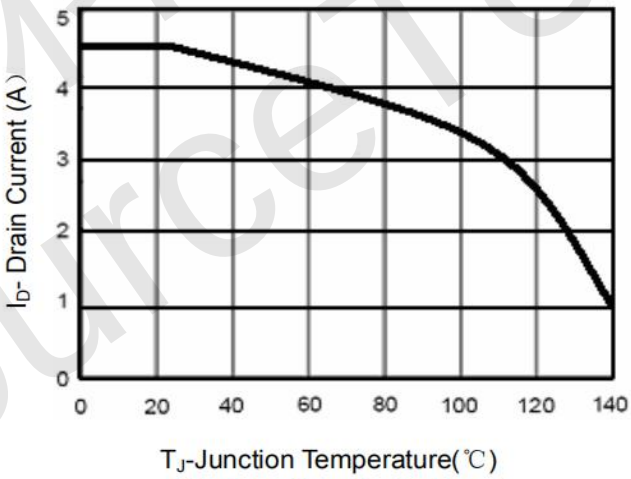


Figure 4 Drain Current

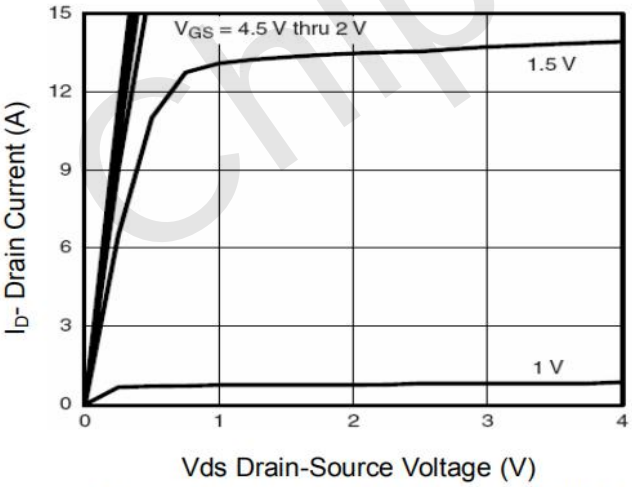


Figure 5 Output CHARACTERISTICS

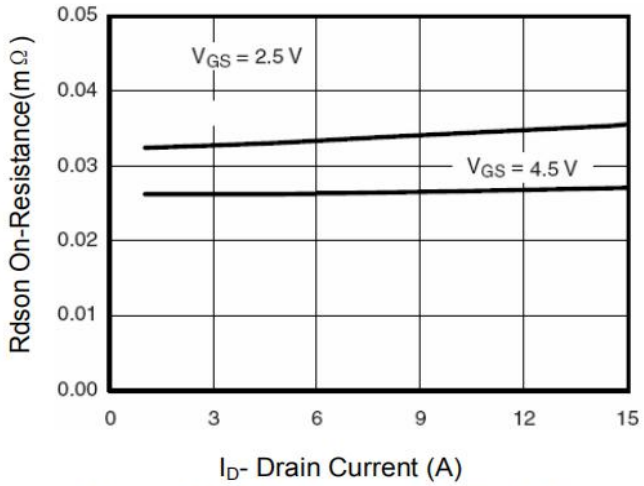


Figure 6 Drain-Source On-Resistance

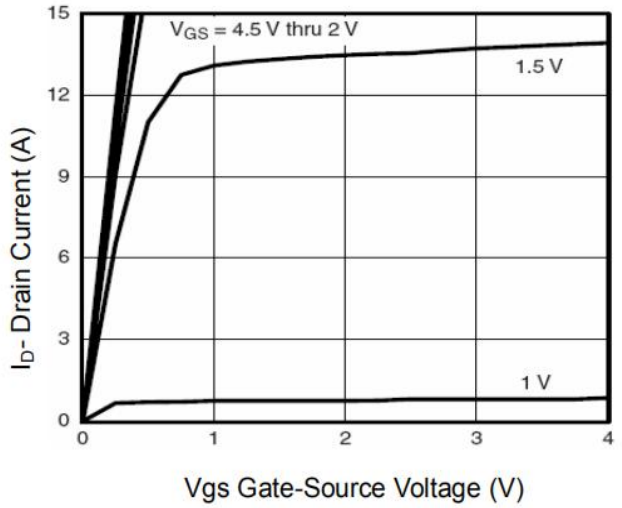


Figure 7 Transfer Characteristics

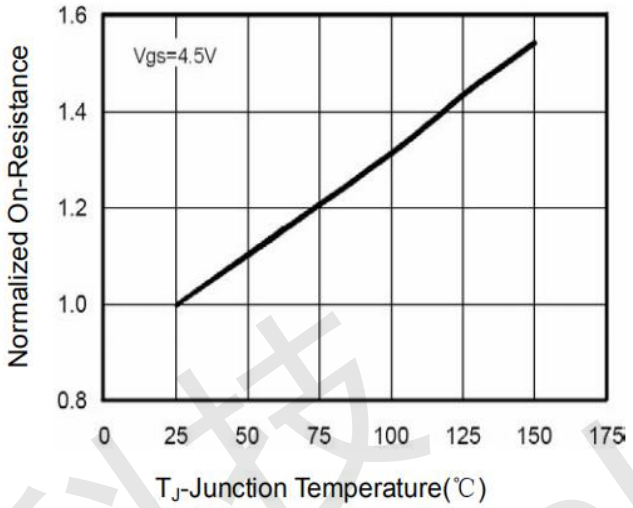


Figure 8 Drain-Source On-Resistance

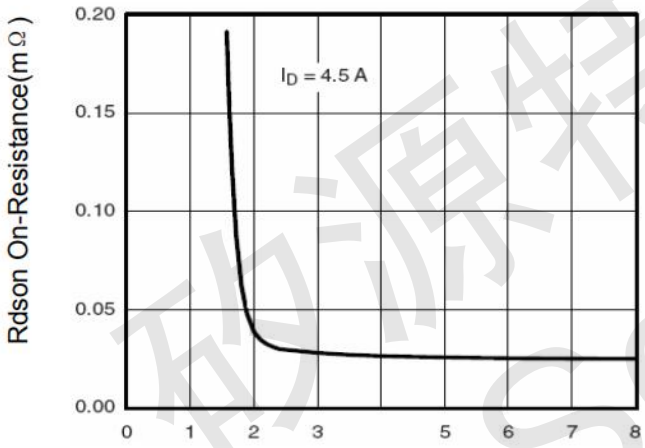


Figure 9 Rdson vs Vgs

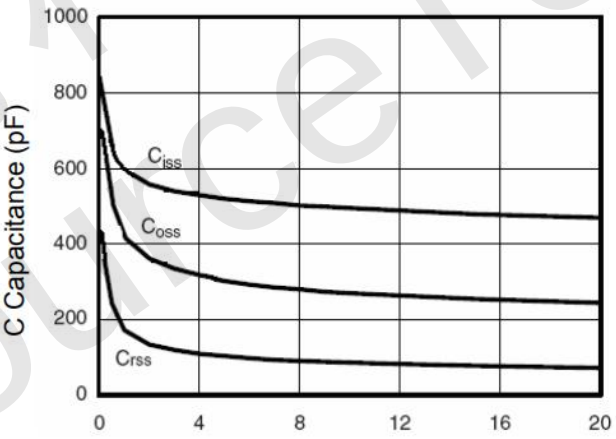


Figure 10 Capacitance vs Vds

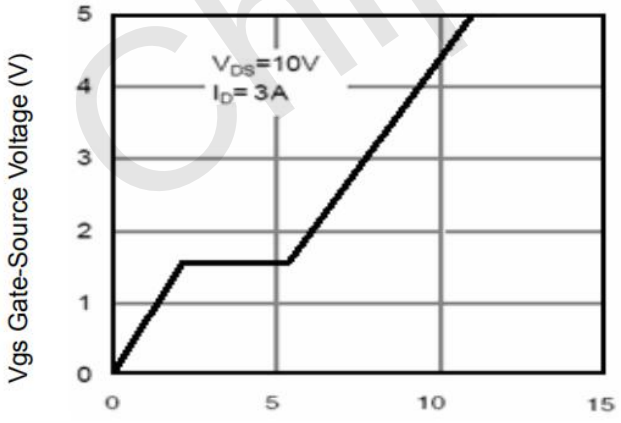


Figure 11 Gate Charge

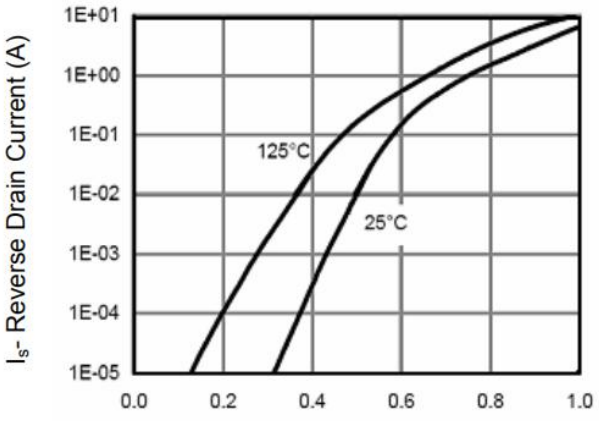


Figure 12 Source- Drain Diode Forward

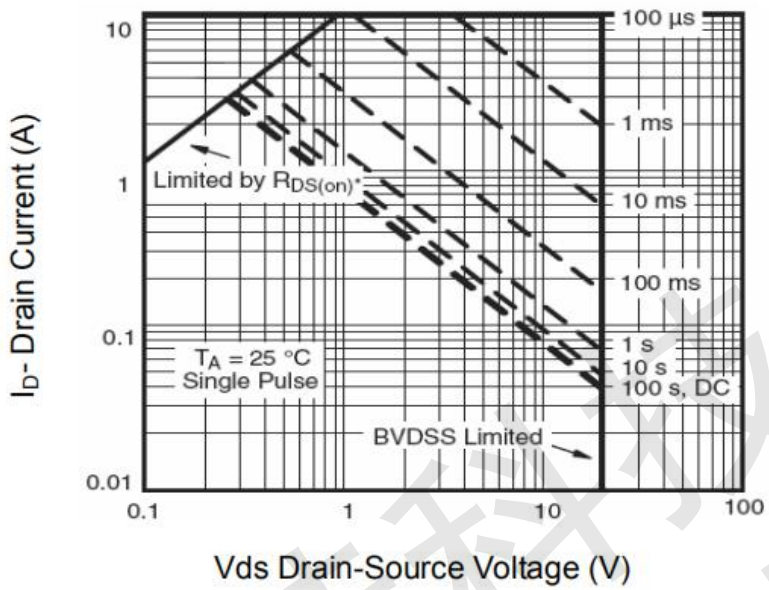


Figure 13 Safe Operation Area

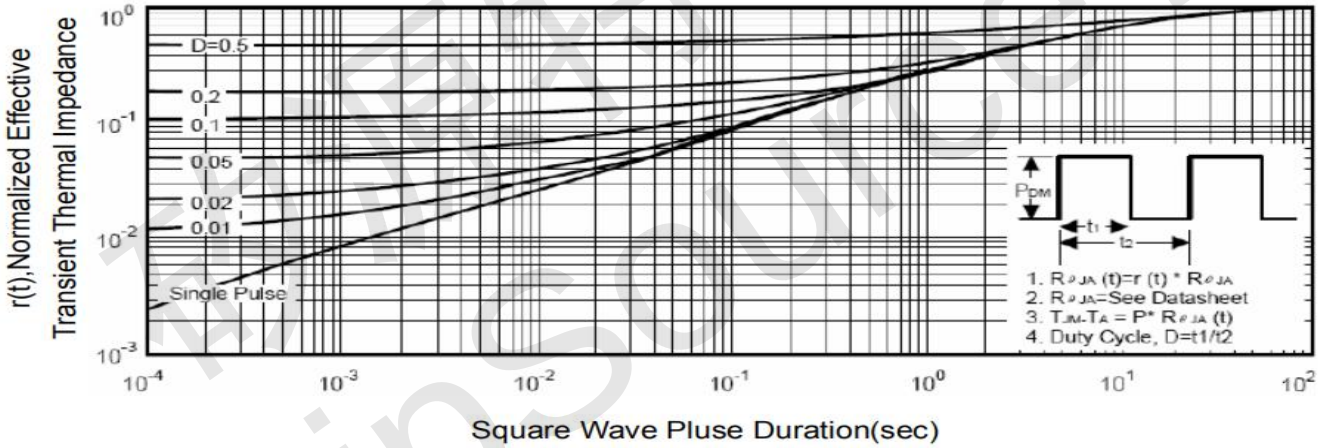
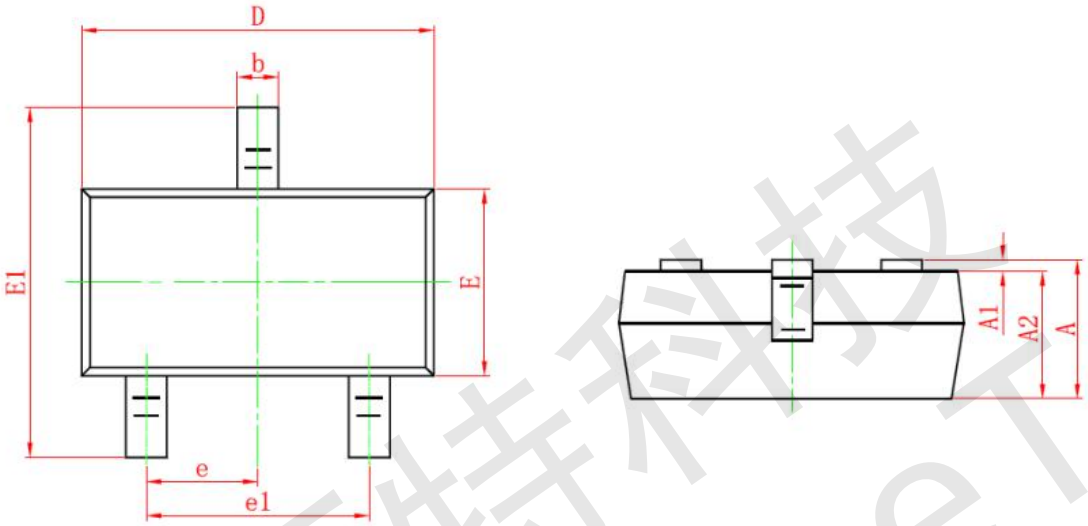
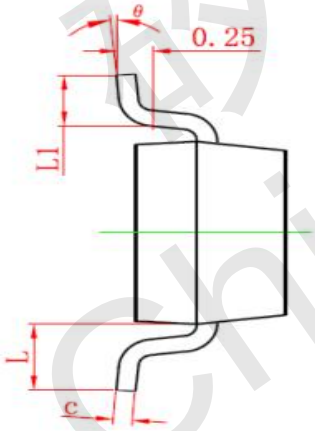


Figure 14 Normalized Maximum Transient Thermal Impedance

SOT-23 PACKAGE INFORMATION

Dimensions in Millimeters (UNIT:mm)





Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

NOTES

1. All dimensions are in millimeters.
2. Tolerance ±0.10mm (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.