XNRUSEMI

XR2300

N-Ch 20V Fast Switching MOSFETs

★ Green Device Available
★ Super Low Gate Charge
★ Excellent Cdv/dt effect decline
★ Advanced high cell density Trench technology

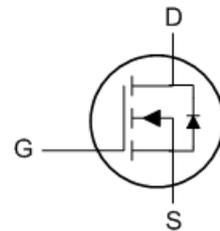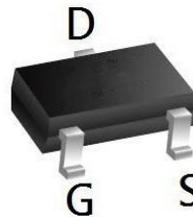**Green**

Product Summary

BVDSS	RDSON	ID
20V	21mΩ	5.2A

Description

The XR2300 is the high cell density trenched N-ch MOSFETs, which provides excellent RDSON and efficiency for most of the small power switching and load switch applications.
The XR2300 meet the RoHS and Green Product requirement with full function reliability approved.

SOT23 Pin Configuration

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	±12	V
I_D@T_A=25°C	Continuous Drain Current, V_{GS} @ 4.5V[1]	5.2	A
I_D@T_A=70°C	Continuous Drain Current, V_{GS} @ 4.5V[1]	3.0	A
I_{DM}	Pulsed Drain Current[2]	16.4	A
P_D@T_A=25°C	Total Power Dissipation[3]	1.0	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient [1]	---	170	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	---	°C/W

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N-Ch 20V Fast Switching MOSFETs

Electrical Characteristics (T$_J$=25℃ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V$_{(BR)DSS}$	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,	-	-	1.0	μA
I$_{GSS}$	Gate to Body Leakage Current	V$_{DS}$=0V, V$_{GS}$ =±12V	-	-	±100	nA
On Characteristics						
V$_{GS(th)}$	Gate Threshold Voltage	V$_{DS}$=V$_{GS}$, I$_D$=250μA	0.4	0.7	1	V
R$_{DS(on)}$	Static Drain-Source on-Resistance note2	V$_{GS}$=4.5V, I$_D$=4A	-	21	27	mΩ
		V$_{GS}$=2.5V, I$_D$=3A	-	29	44	
Dynamic Characteristics						
C$_{iss}$	Input Capacitance	V$_{DS}$=10V, V$_{GS}$=0V, f=1.0MHz	-	358	-	pF
C$_{oss}$	Output Capacitance		-	69.3	-	pF
C$_{rss}$	Reverse Transfer Capacitance		-	58.5	-	pF
Q$_g$	Total Gate Charge	V$_{DS}$=10V, I$_D$=2A, V$_{GS}$=4.5V	-	5.6	-	nC
Q$_{gs}$	Gate-Source Charge		-	0.8	-	nC
Q$_{gd}$	Gate-Drain("Miller") Charge		-	1	-	nC
Switching Characteristics						
t$_{d(on)}$	Turn-on Delay Time	V$_{DS}$=10V, I$_D$=4A, R$_{GEN}$=3Ω, V$_{GS}$=4.5V	-	5	-	ns
t$_r$	Turn-on Rise Time		-	30	-	ns
t$_{d(off)}$	Turn-off Delay Time		-	48	-	ns
t$_f$	Turn-off Fall Time		-	36	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I$_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	4	A
I$_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	16	A
V$_{SD}$	Drain to Source Diode Forward Voltage	V$_{GS}$=0V, I$_S$=4A	-	-	1.2	V

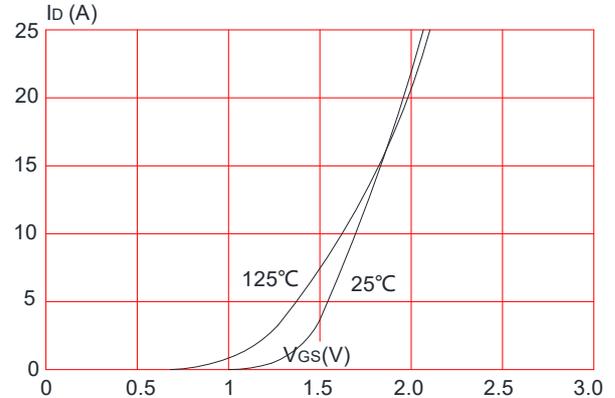Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%
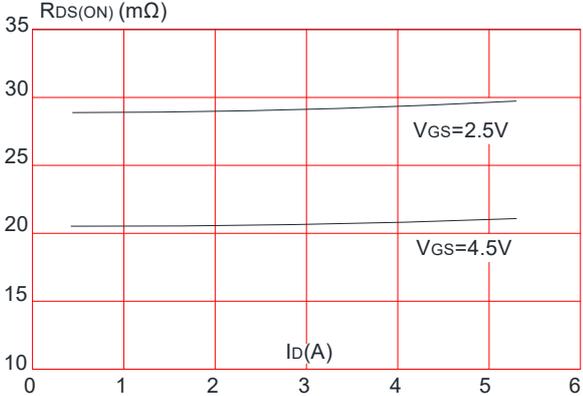
Typical Performance Characteristics

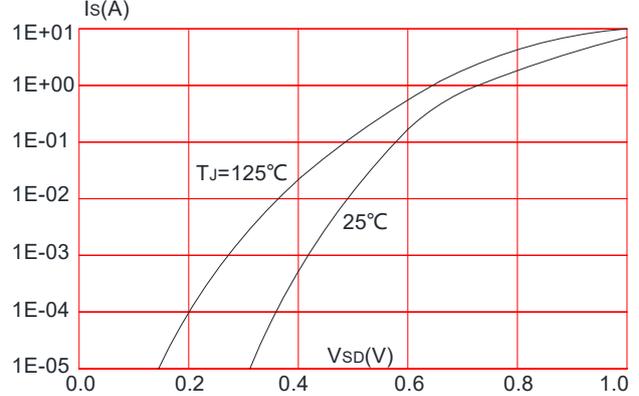**Figure1:** Output Characteristics
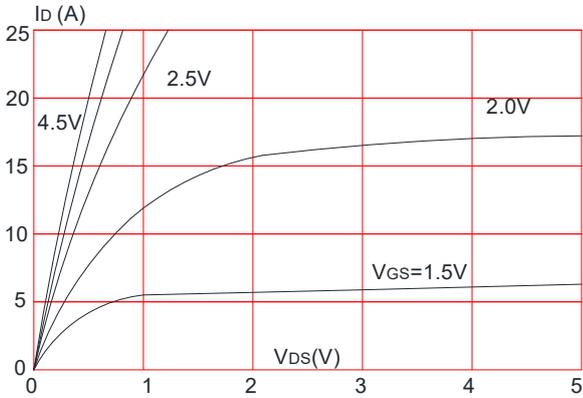
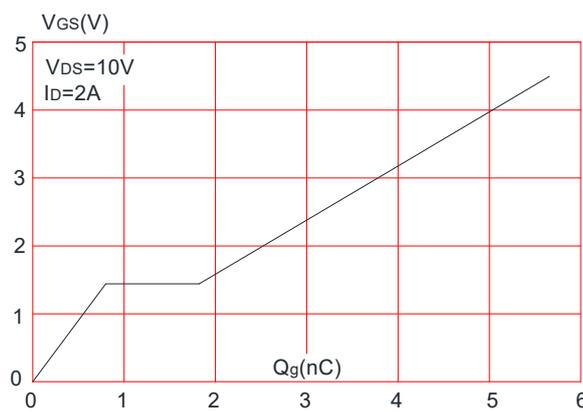
Figure 2: Typical Transfer Characteristics

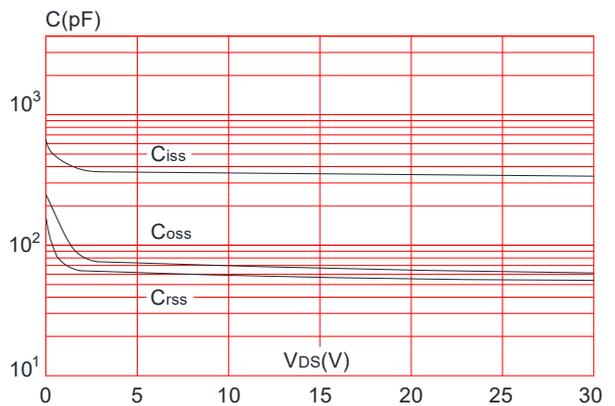**Figure 3:** On-resistance vs. Drain Current

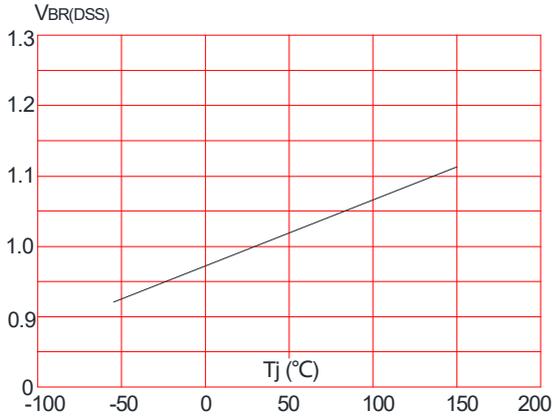**Figure 4:** Body Diode Characteristics

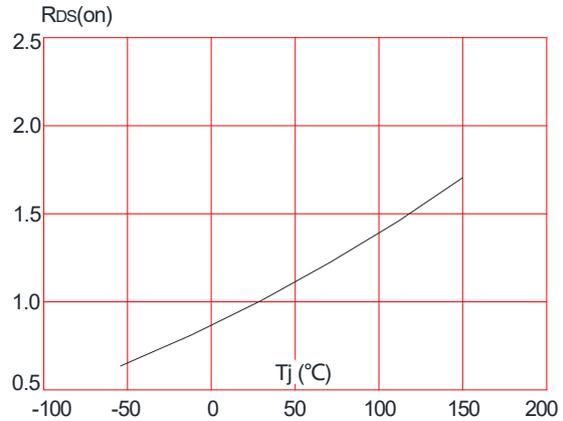**Figure 5:** Gate Charge Characteristics

Figure 6: Capacitance Characteristics
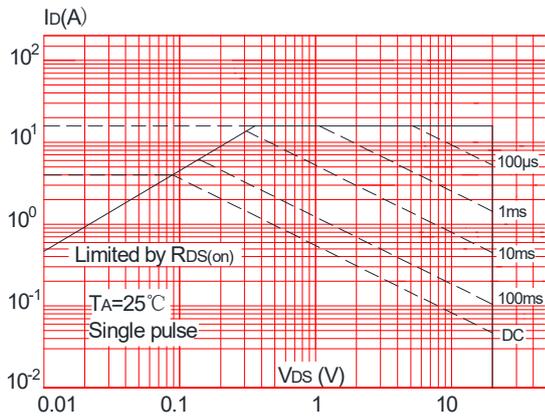

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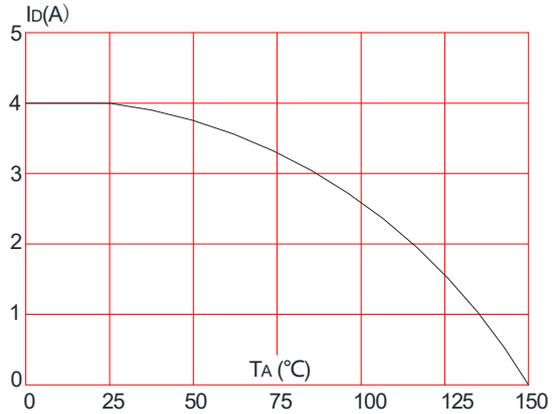**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

Figure 8: Normalized on Resistance vs. Junction Temperature
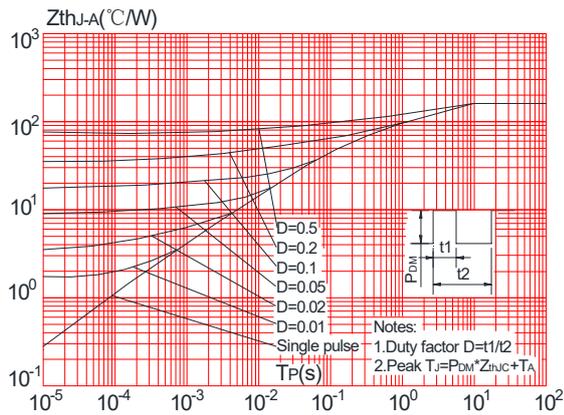

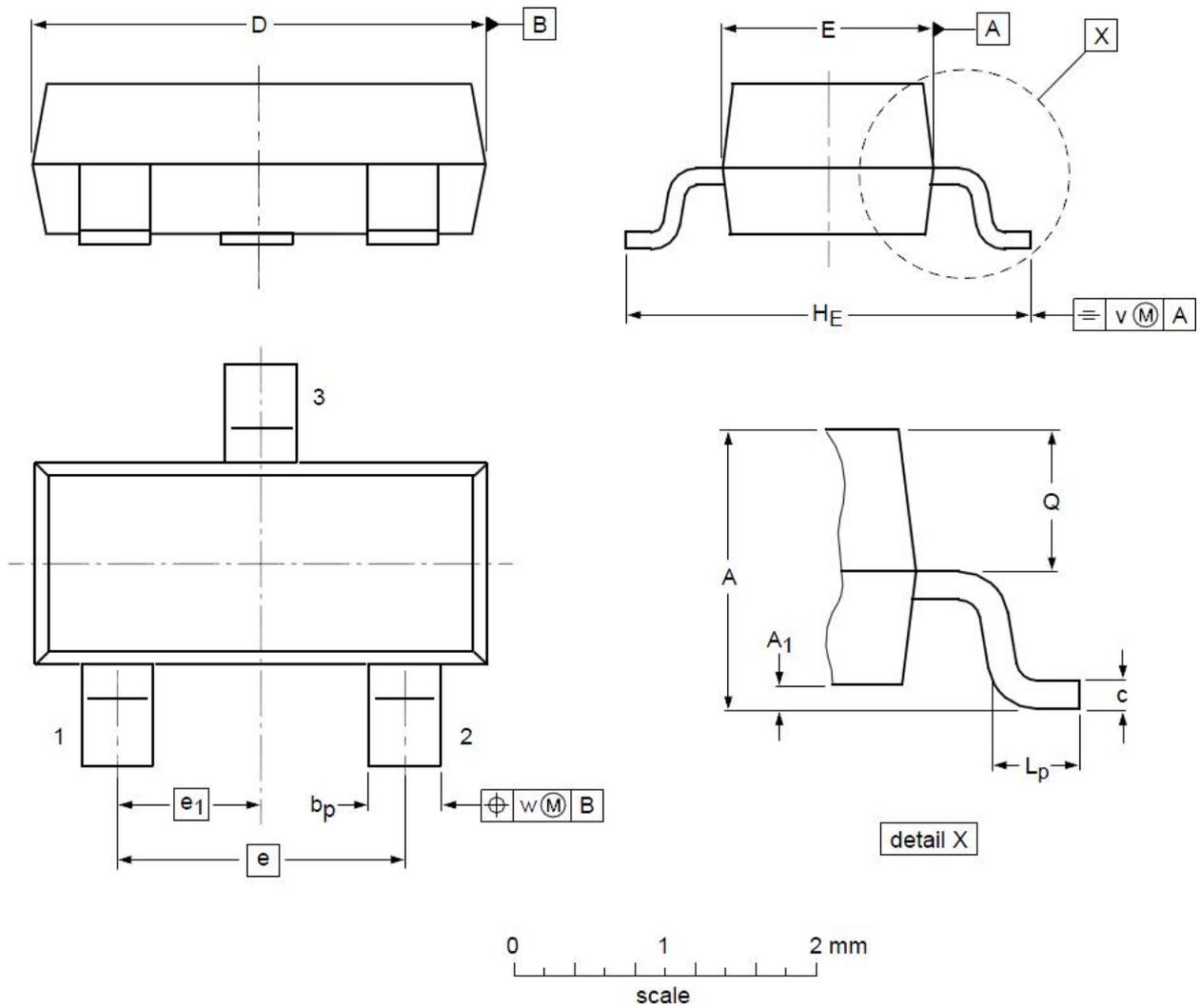**Figure 9:** Maximum Safe Operating Area

Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

Notes:
1. Duty factor $D = t_1/t_2$
2. Peak $T_J = P_{DM} \cdot Z_{thJC} + T_A$

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Package Mechanical Data-SOT-23

DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.01	1.15	A$_1$	0.01	0.05	0.10
b$_p$	0.30	0.42	0.50	c	0.08	0.13	0.15
D	2.80	2.92	3.00	E	1.20	1.33	1.40
e	--	1.90	--	e$_1$	--	0.95	--
H$_E$	2.25	2.40	2.55	L$_p$	0.30	0.42	0.50
Q	0.45	0.49	0.55	v	--	0.20	--
w	--	0.10	--				