XNRUSEMI

P-Ch 20V Fast Switching MOSFETs

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

Product Summary

BVDSS	RDSON	ID
-20V	28mΩ	-5.0A

Description

The XR2305A is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The XR2305A meet the RoHS and Green Product requirement with full function reliability approved.

SOT 23 Pin Configurations
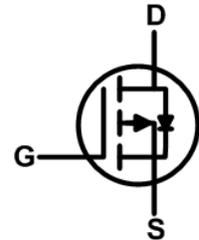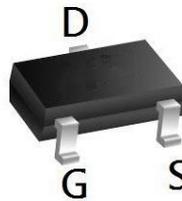
Absolute Maximum Ratings

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]	-5.0	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	A
P_D@T_A=25°C	Total Power Dissipation[3]	1.31	W
P_D@T_A=70°C	Total Power Dissipation[3]	0.84	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]	---	125	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1] (t ≤10s)	---	---	°C/W

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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	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	-1.0	V
R$_{DS(on)}$	Static Drain-Source on-Resistance note2	V$_{GS}$= -4.5V, I$_D$= -4.1A	-	28	35	mΩ
		V$_{GS}$= -2.5V, I$_D$= -3A	-	38	53	
Dynamic Characteristics						
C$_{iss}$	Input Capacitance	V$_{DS}$= -10V, V$_{GS}$=0V, f=1.0MHz	-	830	-	pF
C$_{oss}$	Output Capacitance		-	132	-	pF
C$_{rss}$	Reverse Transfer Capacitance		-	85	-	pF
Q$_g$	Total Gate Charge	V$_{DS}$= -10V, I$_D$= -2A, V$_{GS}$= -4.5V	-	8.8	-	nC
Q$_{gs}$	Gate-Source Charge		-	1.4	-	nC
Q$_{gd}$	Gate-Drain("Miller") Charge		-	1.9	-	nC
Switching Characteristics						
t$_{d(on)}$	Turn-on Delay Time	V$_{DD}$= -10V, I$_D$= -3.3A, R$_G$= 1Ω, V$_{GEN}$= -4.5V	-	10	-	ns
t$_r$	Turn-on Rise Time		-	32	-	ns
t$_{d(off)}$	Turn-off Delay Time		-	50	-	ns
t$_f$	Turn-off Fall Time		-	51	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I$_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	-5.0	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$_S$= -4.1A	-	-	-1.2	V

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

　　　2. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

Typical Performance Characteristics
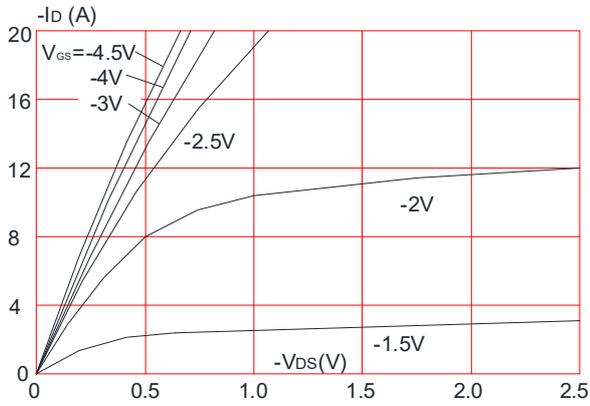
Figure1: Output Characteristics

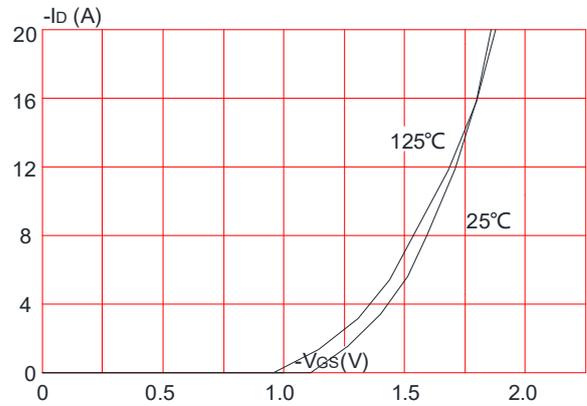**Figure 2:** Typical Transfer Characteristics
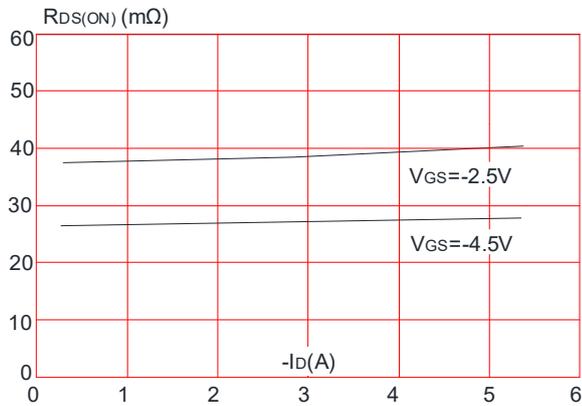

Figure 3: On-resistance vs. Drain Current

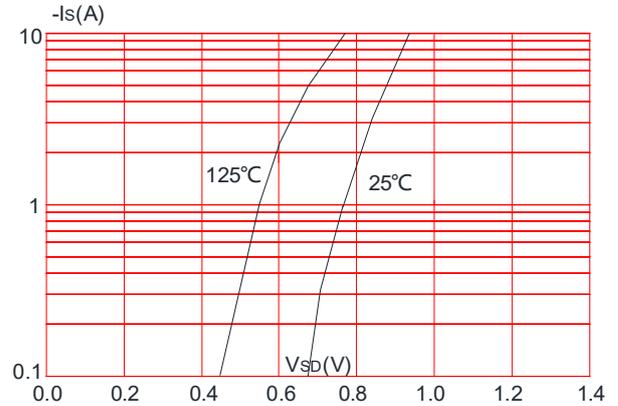**Figure 4:** Body Diode Characteristics
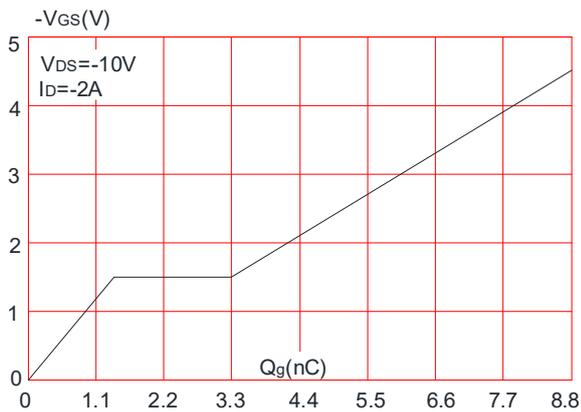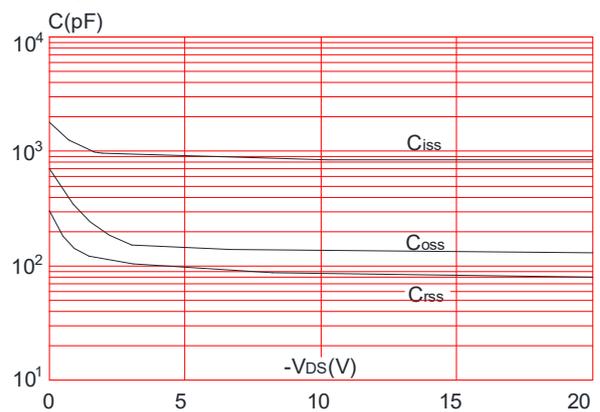

Figure 5: Gate Charge Characteristics

Figure 6: Capacitance Characteristics

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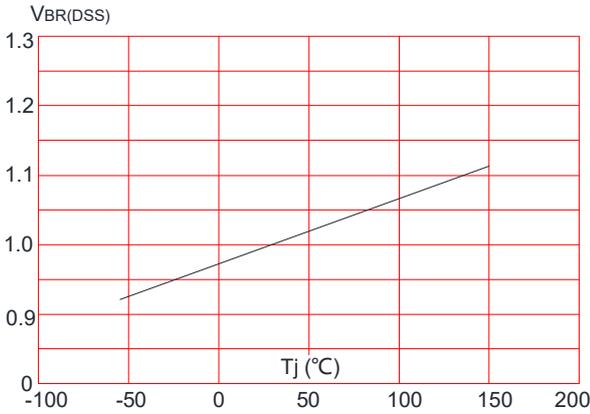**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

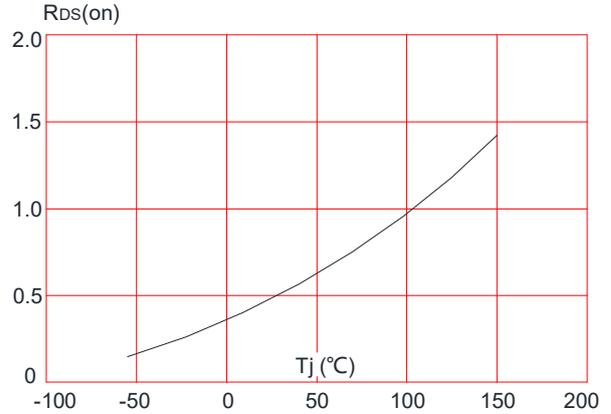**Figure 8:** Normalized on Resistance vs. Junction Temperature

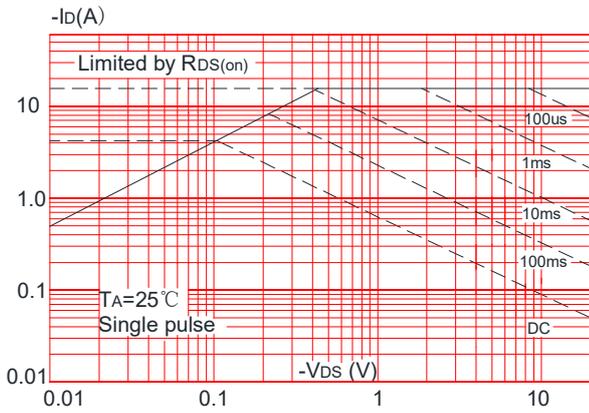**Figure 9:** Maximum Safe Operating Area

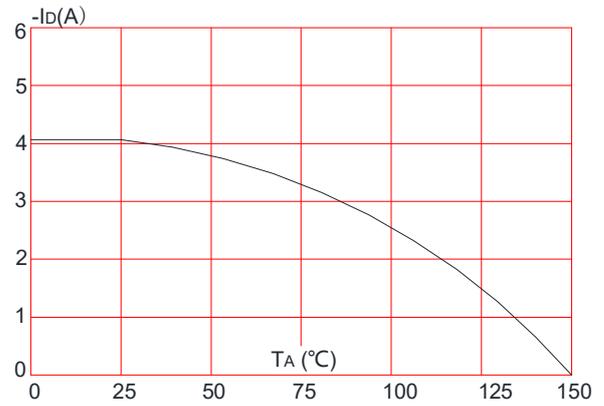**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

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

Notes:
1.Duty factor D=t1/t2
2.Peak $T_J=P_{DM}*Z_{thJA}+T_A$

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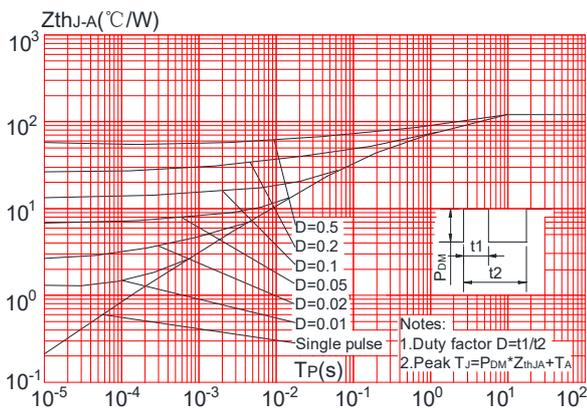
Package Mechanical Data-SOT-23
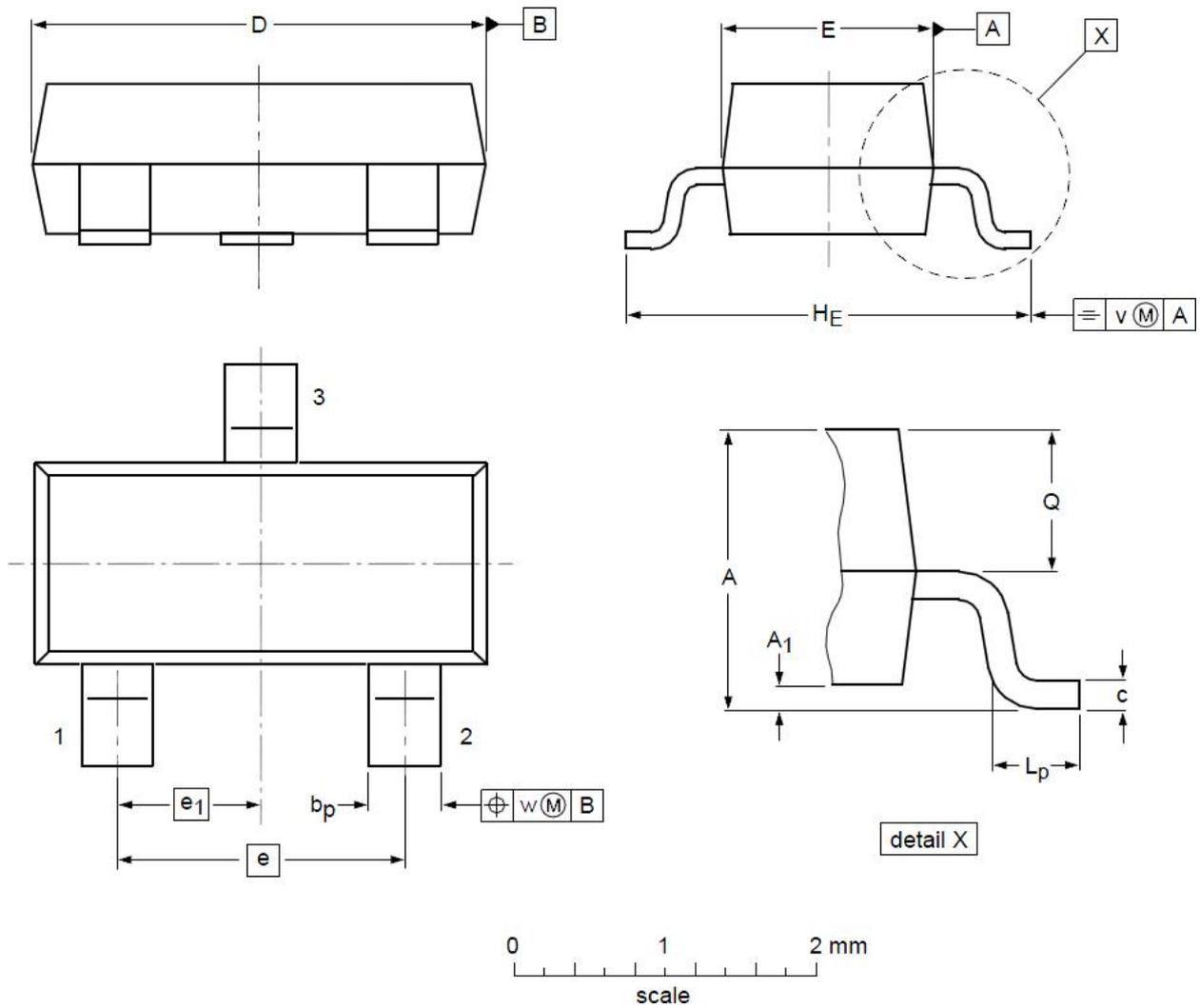
DIMENSIONS (unit : mm)

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	--				