

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

Product Summary

RoHS

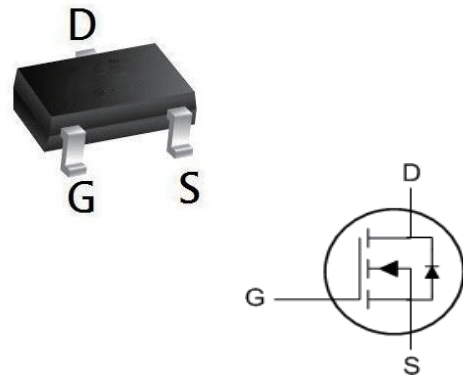
BVDSS	RDS(on)	ID
20V	35mΩ	3.6A

Description

The 2302 is the high cell density trenched N-ch MOSFETs, which provide excellent $R_{DS(on)}$ and efficiency for most of the small power switching and load switch applications.

The 2302 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
$I_{D@T_A=25^\circ C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	3.6	A
$I_{D@T_A=70^\circ C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	1.5	A
I_{DM}	Pulsed Drain Current ²	12	A
$P_{D@T_A=25^\circ C}$	Total Power Dissipation ³	1.05	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	112	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	---	$^\circ C/W$

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown n Voltage	V _{GS} = 0 V, I _b = 250 uA	20	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20 V, V _{GS} = 0 V	--	--	1	uA
		V _{DS} = 16V, T _C = 125°C	--	--	10	uA
I _{GSSF}	Gate-Body Leakage Current, Forw ard	V _{GS} = 10V, V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -10 V, V _{DS} = 0 V	--	--	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _b = 250 uA	0.45	-	1.1	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 4.5 V, I _b =3.5A	--	35	45	mΩ
		V _{GS} = 2.5 V, I _b =2.0A	-	46	57	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 10V, V _{GS} = 0 V, f = 1.0 MHz	--	180	-	pF
C _{oss}	Output Capacitance		--	37	-	pF
C _{rss}	Reverse Transfer Capacitance		--	34	-	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{GS} =5 V, V _{DS} =10V, I _b =3A, R _G = 6 Ω ,R _D = 2.7 Ω	--	4.5	--	ns
t _r	Turn-On Rise Time		--	31	--	ns
t _{d(off)}	Turn-Off Delay Time		--	12	--	ns
t _f	Turn-Off Fall Time	V _{DS} = 10 V, I _b =3A, V _{GS} = 5V	--	4	--	ns
Q _g	Total Gate Charge		--	6.23	--	nC
Q _{gs}	Gate-Source Charge		--	6	--	nC
Q _{gd}	Gate-Drain Charge		--	0.5	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forw ard Current		--	--	3.5	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forw ard Current		--	--	10.5	A
V _{SD}	Drain to Source Diode Forw ard Voltage,	V _{GS} = 0V, I _{SD} =3.5A,,T _J = 25 °C	--	--	1.2	V

Note :

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. Device mounted on FR-4 PCB, 1inch x 0.85inch x 0.062 inch
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$

Typical Performance Characteristics

Figure1: On-Region Characteristics

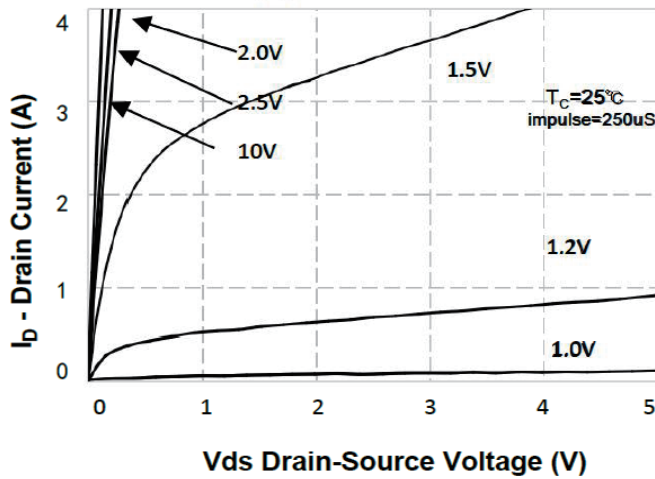


Figure 2: Transfer Characteristics

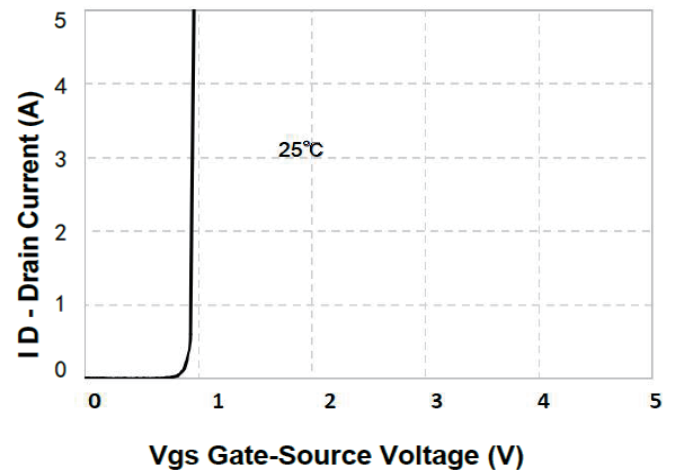


Figure 3: On-resistance vs. Drain Current

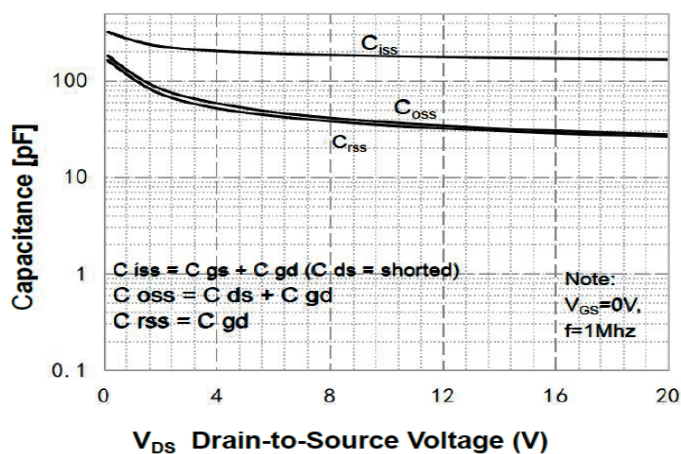


Figure 4: Body Diode Characteristics

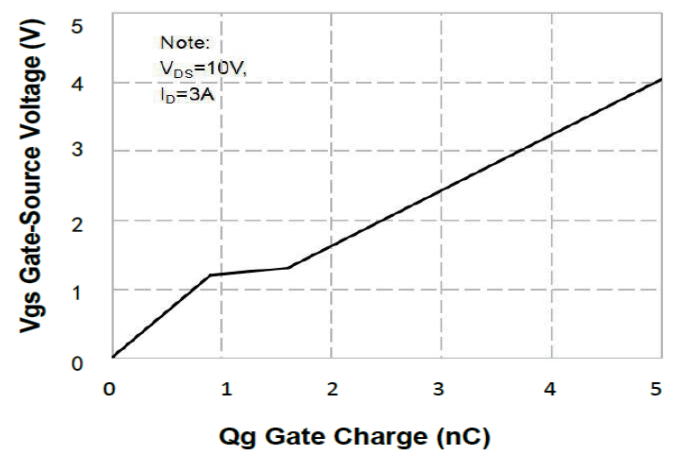


Figure 5: Capacitance Characteristics

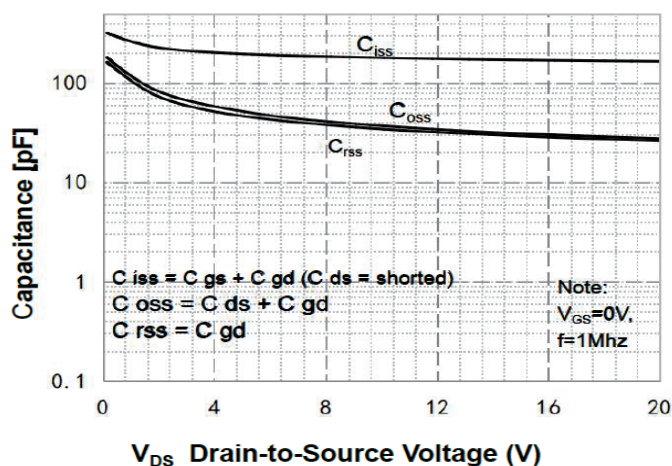
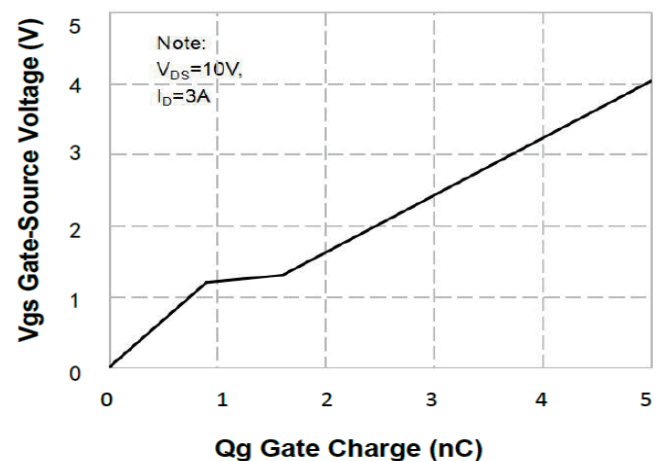


Figure 6: Gate Charge Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown Voltage

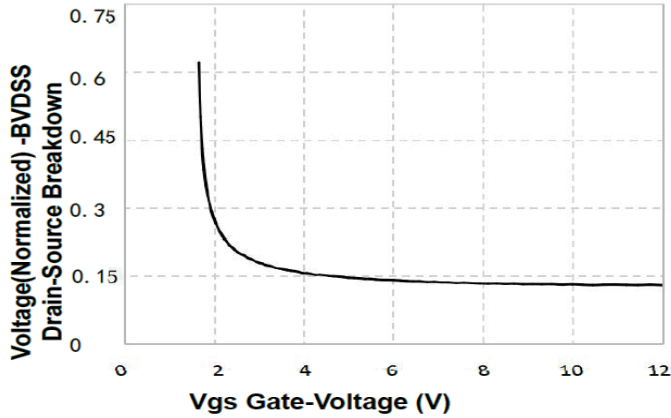


Figure 7. Breakdown Voltage Variation vs Gate-Voltage

Figure 8: Normalized on Resistance vs. Junction Temperature

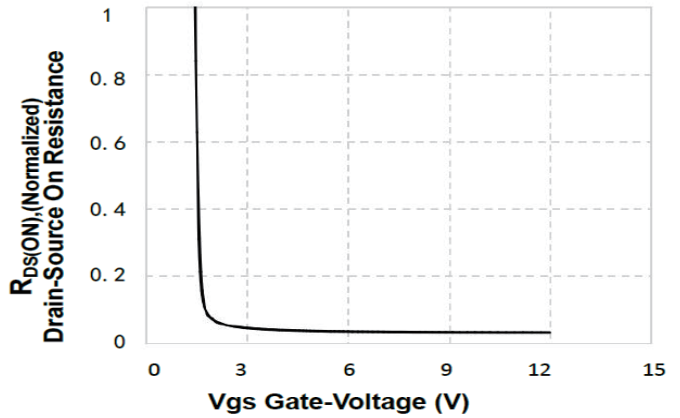


Figure 8. On-Resistance Variation vs Gate Voltage

Figure 9: Maximum Safe Operating Area

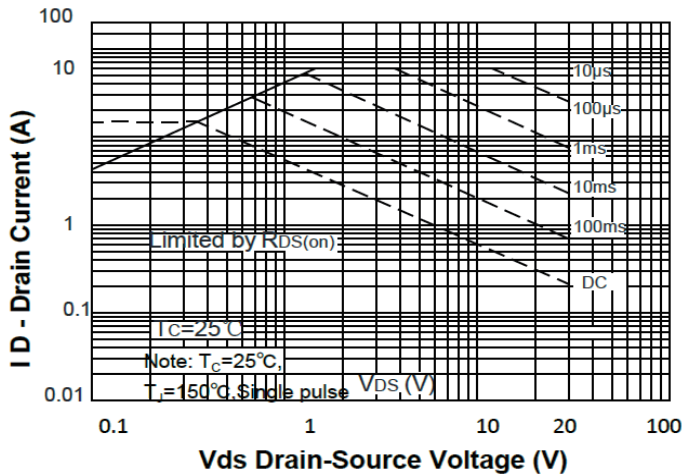


Figure 10: Maximum Continuous Drain Current

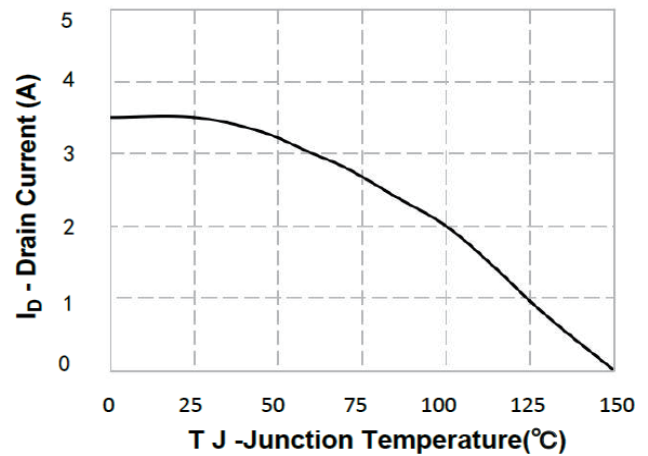
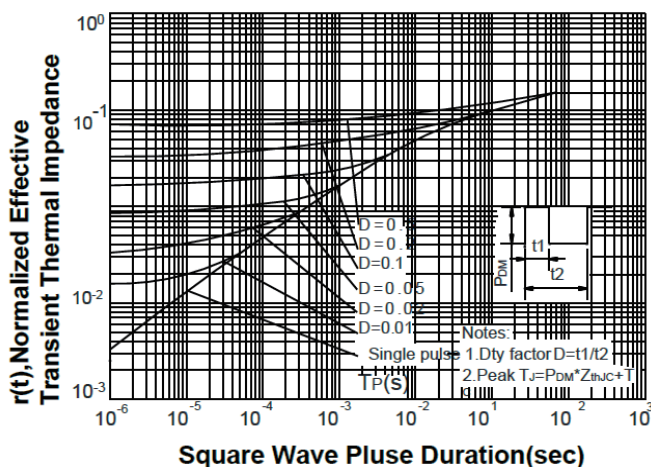
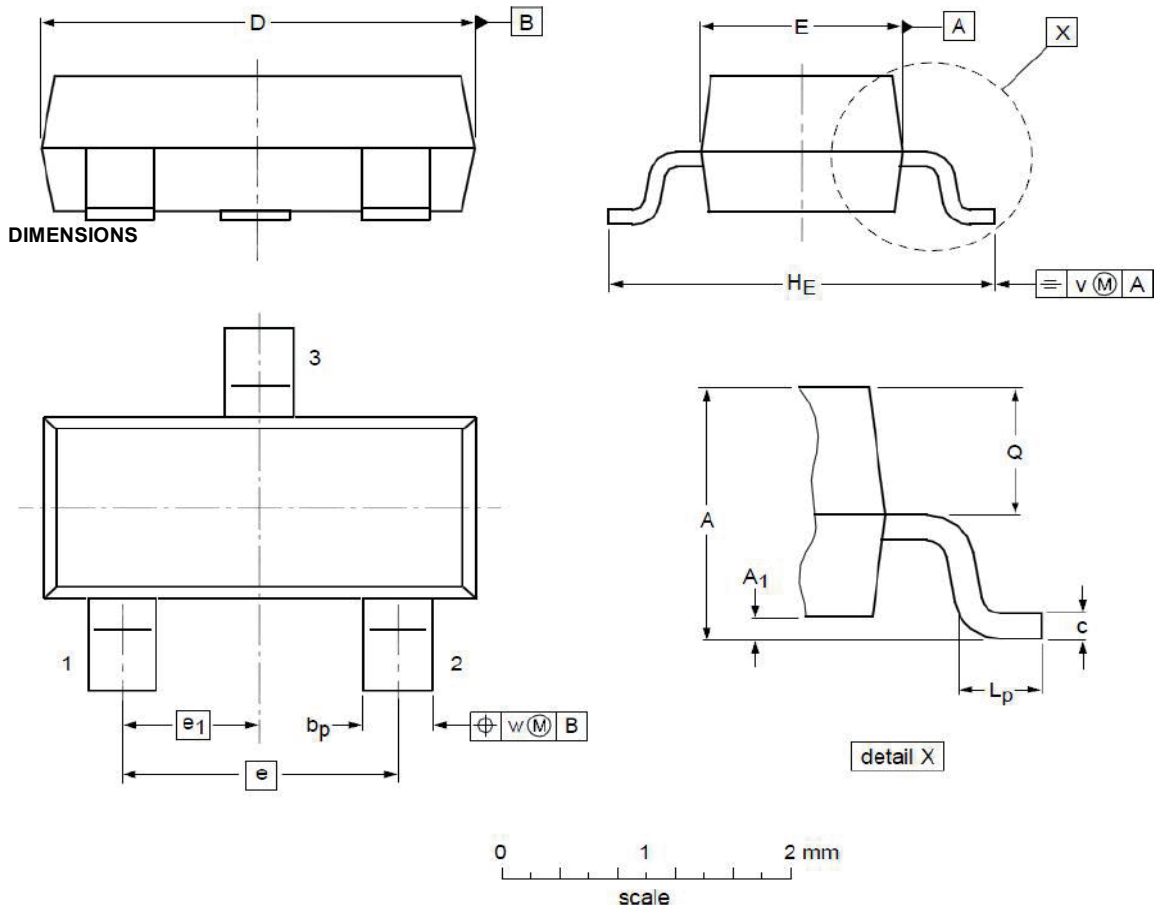


Figure.11: Maximum Effective Transient Thermal Impedance



SOT23 Mechanical tData



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.9	1.01	1.15	A₁	0.01	0.05	0.1
b_p	0.3	0.42	0.5	c	0.08	0.13	0.15
D	2.8	2.92	3	E	1.2	1.33	1.4
e	--	1.9	--	e₁	--	0.95	--
H_E	2.25	2.4	2.55	L_p	0.3	0.42	0.5
Q	0.45	0.49	0.55	v	--	0.2	--
w	--	0.1	--				