N-Ch 20V Fast Switching MOSFETs

General Description

The US2302 is the highest performance trench N-ch MOSFETs with extreme high cell density , which provide excellent RDSON and gate charge for most of the small power switching and load switch applications.

The US2302 meet the RoHS and Green Product requirement with full function reliability approved.

Features

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

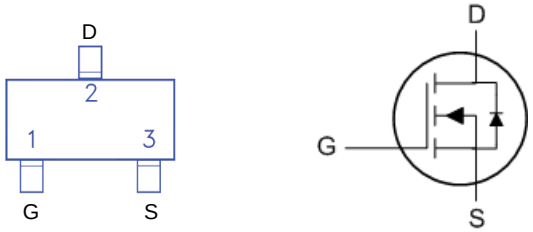
Product Summery

BV_{DSS}	$R_{DS(ON)}$	ID
20V	120m Ω	3.0A

Applications

- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems.

SOT23 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
V_{DSS}	Drain-Source Voltage		20	V
V_{GSS}	Gate-Source Voltage		±12	
I_D*	Continuous Drain Current	V_{GS}=4.5V	3	A
I_{DM}*	300μs Pulsed Drain Current		10	
I_S*	Diode Continuous Forward Current		1	A
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	
P_D*	Maximum Power Dissipation	T_A=25°C	0.83	W
		T_A=100°C	0.3	
$R_{θJA}$*	Thermal Resistance-Junction to Ambient		150	°C/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

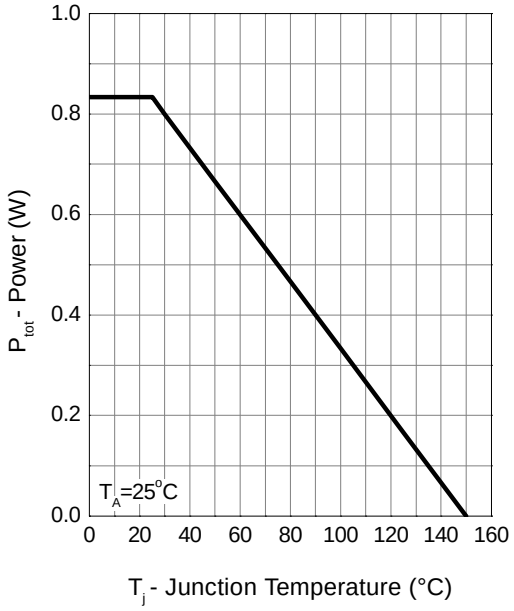
Symbol	Parameter	Test Conditions	US2302			Unit
			Min.	Typ.	Max.	
STATIC CHARACTERISTICS						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=16V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	0.5	0.7	1	V
I_{GSS}	Gate Leakage Current	V_{GS}=±10V, V_{DS}=0V	-	-	±10	μA
$R_{DS(ON)}$ [a]	Drain-Source On-state Resistance	V_{GS}=4.5V, I_{DS}=3A	-	50	65	mΩ
		V_{GS}=2.5V, I_{DS}=2A	-	65	90	
		V_{GS}=1.8V, I_{DS}=0.5A	-	120	200	
V_{SD} [a]	Diode Forward Voltage	I_{SD}=1A, V_{GS}=0V	-	0.7	1.3	V
GATE CHARGE CHARACTERISTICS [b]						
Q_g	Total Gate Charge	V_{DS}=10V, V_{GS}=4.5V, I_{DS}=3A	-	4.4	6	nC
Q_{gs}	Gate-Source Charge		-	0.5	-	
Q_{gd}	Gate-Drain Charge		-	1.6	-	

Symbol	Parameter	Test Conditions	US2302			Unit
			Min.	Typ.	Max.	
DYNAMIC CHARACTERISTICS [b]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	5	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=10V, Frequency=1.0MHz	-	320	-	pF
C_{oss}	Output Capacitance		-	70	-	
C_{rss}	Reverse Transfer Capacitance		-	50	-	
$t_{d(ON)}$	Turn-On Delay Time	V_{DD}=10V, R_L=10Ω, I_{DS}=1A, V_{GEN}=4.5V, R_G=6Ω	-	4	8	ns
t_r	Turn-On Rise Time		-	14	26	
$t_{d(OFF)}$	Turn-Off Delay Time		-	21	39	
t_f	Turn-Off Fall Time		-	5	10	
t_{rr}	Reverse Recovery Time	I_{SD}=3A, dI_{SD}/dt=100A/μs	-	15	-	ns
Q_{rr}	Reverse Recovery Charge		-	6	-	nC

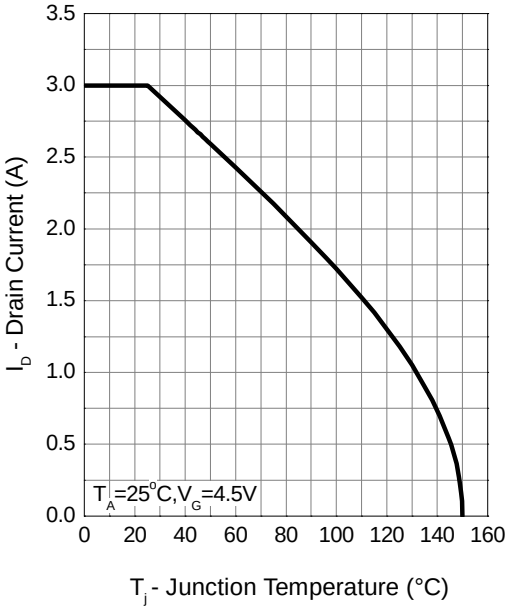
Note a : Pulse test ; pulse width≤300μs, duty cycle≤2%.
Note b : Guaranteed by design, not subject to production testing.

Typical Characteristics

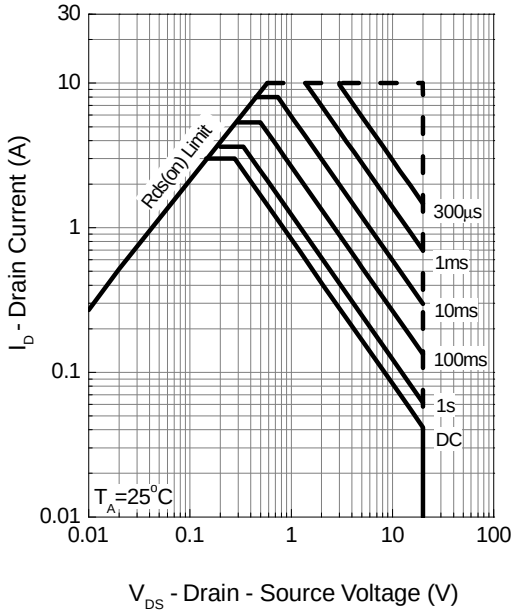
Power Dissipation



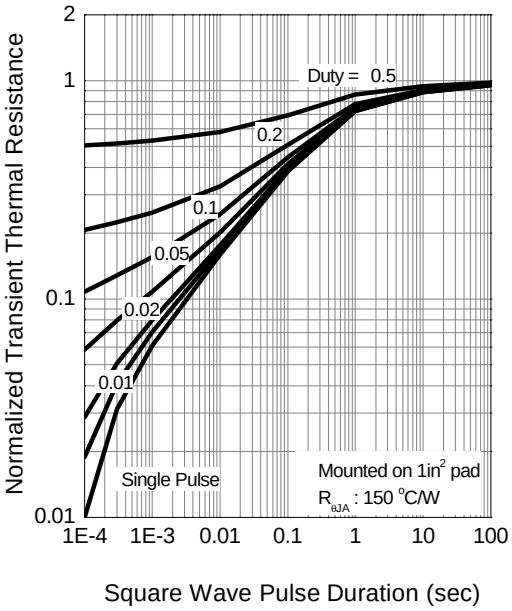
Drain Current



Safe Operation Area

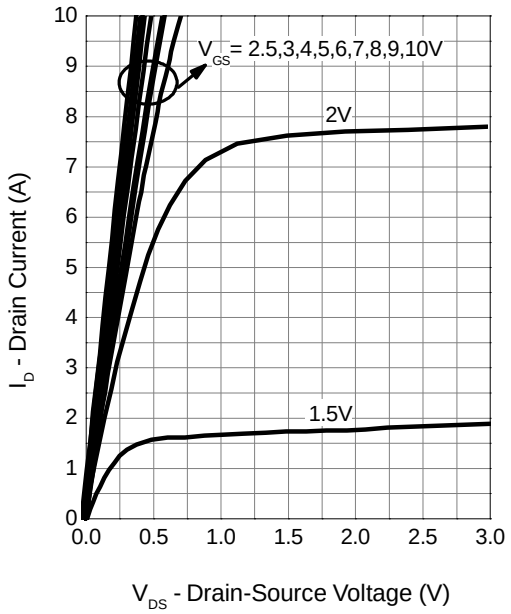


Thermal Transient Impedance

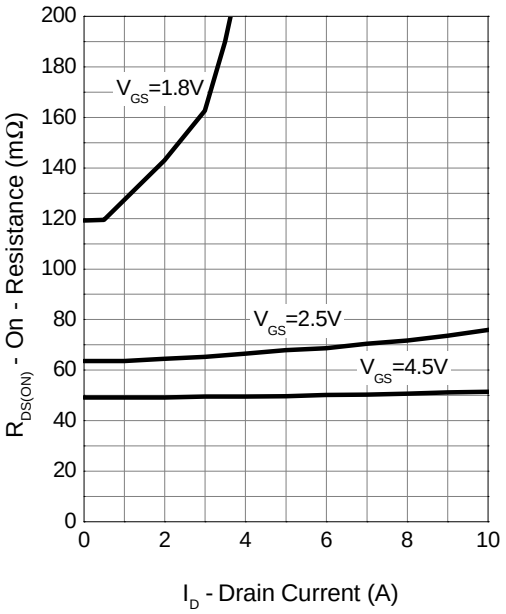


Typical Characteristics

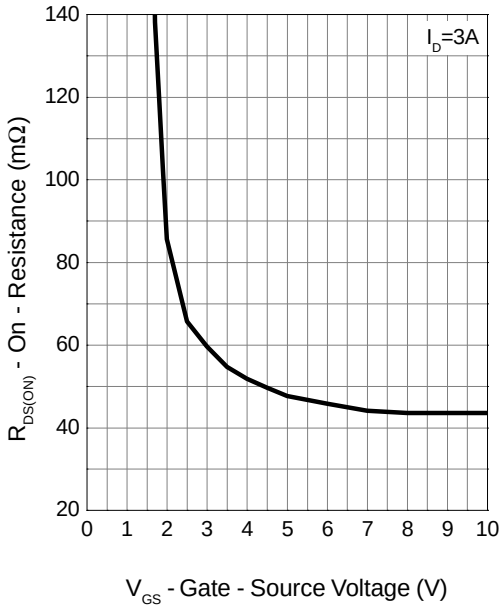
Output Characteristics



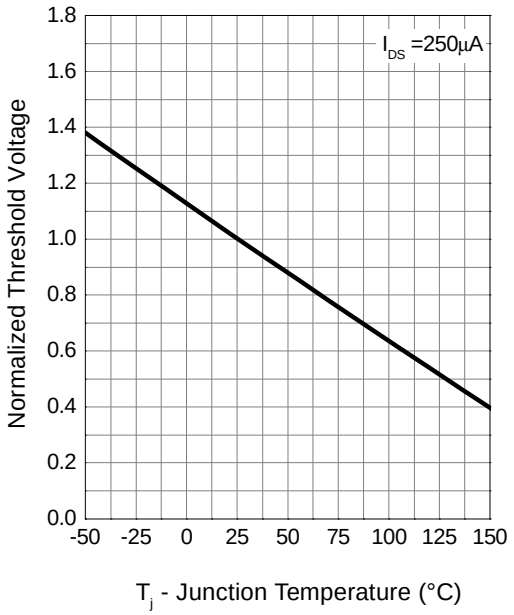
Drain-Source On Resistance



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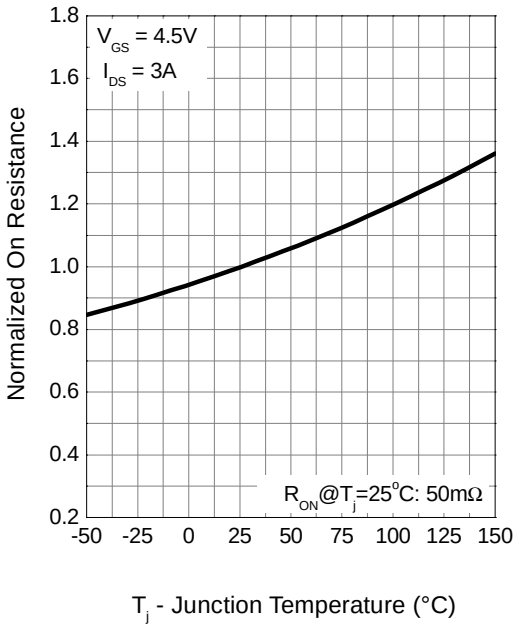


Gate Threshold Voltage

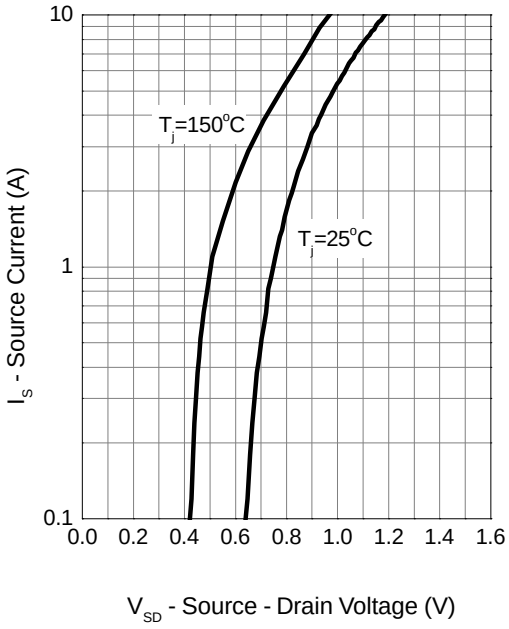


Typical Characteristics

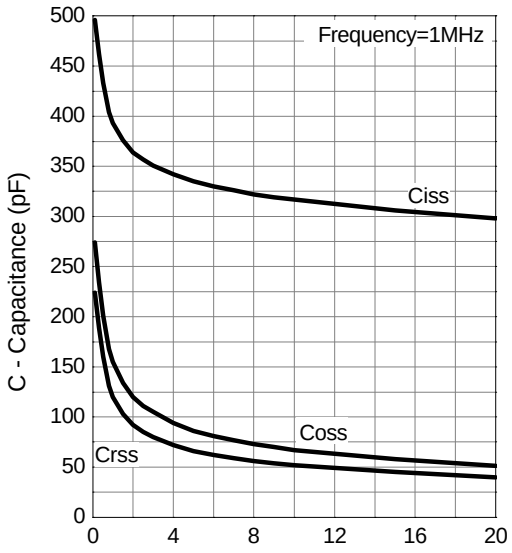
Drain-Source On Resistance



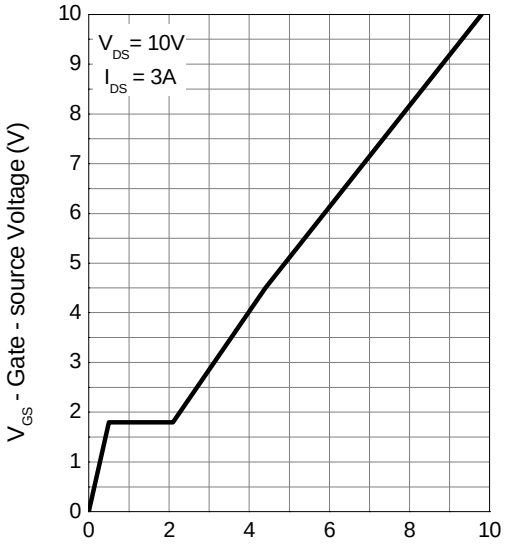
Source-Drain Diode Forward



Capacitance

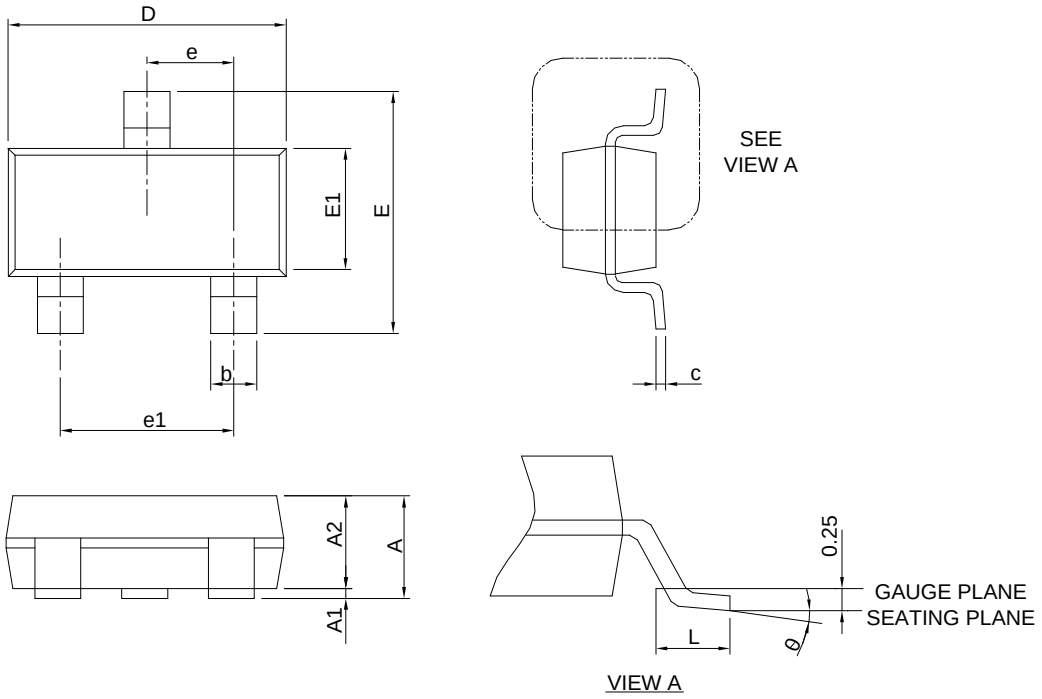


Gate Charge



Typical Characteristics

SOT-23



SYMBOL	SOT-23			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		1.45		0.057
A1	0.00	0.15	0.000	0.006
A2	0.90	1.30	0.035	0.051
b	0.30	0.50	0.012	0.020
c	0.08	0.22	0.003	0.009
D	2.70	3.10	0.106	0.122
E	2.60	3.00	0.102	0.118
E1	1.40	1.80	0.055	0.071
e	0.95 BSC		0.037 BSC	
e1	1.90 BSC		0.075 BSC	
L	0.30	0.60	0.012	0.024
θ	0°	8°	0°	8°

Note : Dimension D and E1 do not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 10 mil per side.