N-Ch 20V Fast Switching MOSFETs

General Description

The US2300 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 US2300 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

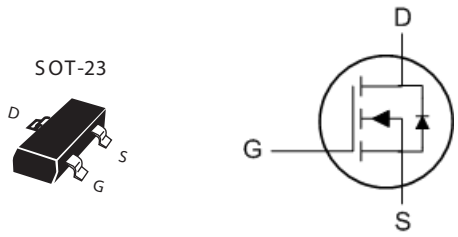
Product Summery

BV_{DSS}	$R_{DS(ON)}$	ID
20V	55mΩ	6.0A

Applications

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

SOT23 Pin Configuration



Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous @ T_J=25℃	I_D	6	A
-Pulsed [b]	I_{DM}	20	A
Drain-Source Diode Forward Current	I_S	1.25	A
Maximum Power Dissipation [a]	P_D	1.25	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C

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

Parameter	Symbol	Condition	Min	Typ [c]	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	20			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=16V, V_{GS}=0V			1	uA
Gate-Body Leakage	I_{GSS}	V_{GS}=± 10V, V_{DS}=0V			±100	nA
ON CHARACTERISTICS [b]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	0.5	0.8	1.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=4A		30	40	m-ohm
		V_{GS}=2.5V, I_D=2A		38	55	m-ohm
On-State Drain Current	$I_{D(ON)}$	V_{DS}=5V, V_{GS}=4.5V	6			A
Forward Transconductance	g_{FS}	V_{DS}=5V, I_D=4A		18.1		S
DYNAMIC CHARACTERISTICS [c]						
Input Capacitance	C_{ISS}	V_{DS}=15V, V_{GS}=0V f=1.0MHz		803		pF
Output Capacitance	C_{OSS}			120		pF
Reverse Transfer Capacitance	C_{RSS}			85		pF
SWITCHING CHARACTERISTICS [c]						
Turn-On Delay Time	$t_{D(ON)}$	V_{DD}=10V, I_D=1A, V_{GS}=4.5V, R_{GEN}=6 ohm		15		ns
Rise Time	t_r			18		ns
Turn-Off Delay Time	$t_{D(OFF)}$			78		ns
Fall Time	t_f			27		ns
Total Gate Charge	Q_g	V_{DS}=10V, I_D=4A, V_{GS}=4.5V		8.8		nC
Gate-Source Charge	Q_{gs}			1.8		nC
Gate-Drain Charge	Q_{gd}			3.9		nC

Typical Characteristics

ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS [b]						
Diode Forward Voltage	V_{SD}	V_{GS} = 0V, Is = 1.25A		0.8	1.2	V

Notes
a.Surface Mounted on FR4 Board, t <=10sec.
b.Pulse Test:Pulse Width ≤ 300us, Duty Cycle ≤ 2%.
c.Guaranteed by design, not subject to production testing.

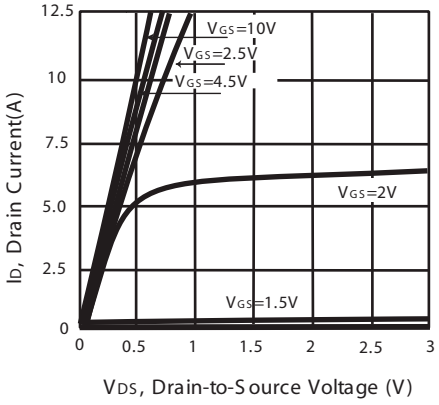


Figure 1. Output Characteristics

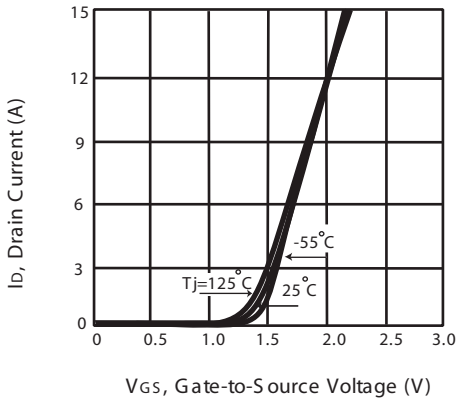


Figure 2. Transfer Characteristics

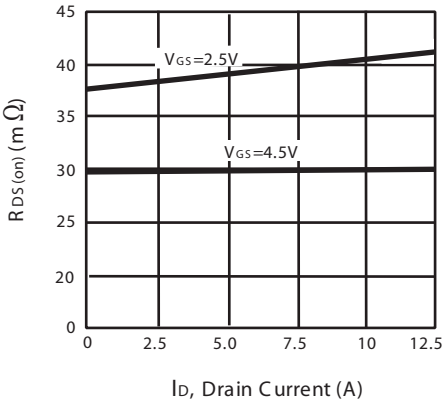


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

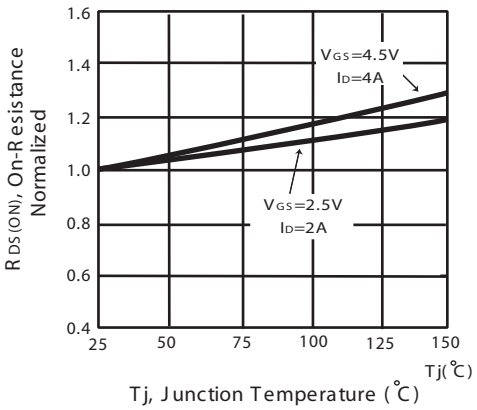


Figure 4. On-Resistance Variation with Drain Current and Temperature

Typical Characteristics

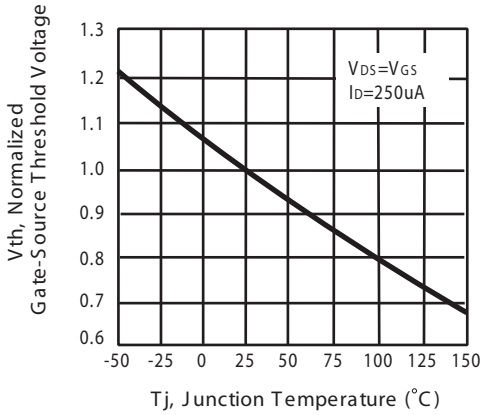


Figure 5. Gate Threshold Variation with Temperature

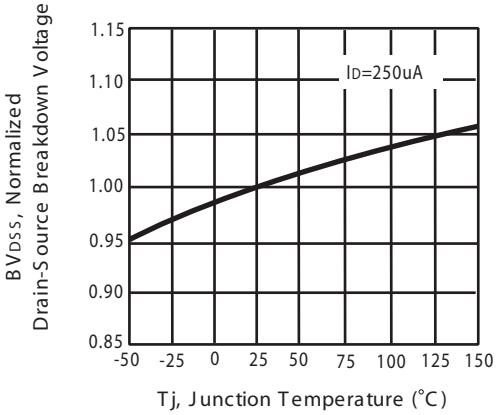


Figure 6. Breakdown Voltage Variation with Temperature

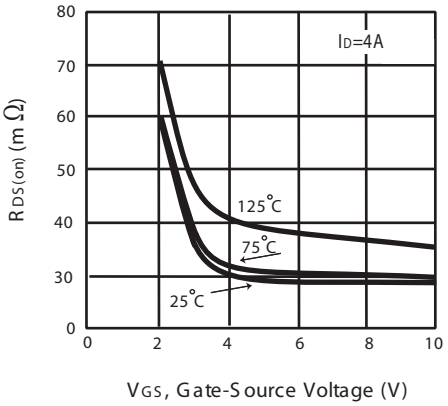


Figure 7. On-Resistance vs. Gate-Source Voltage

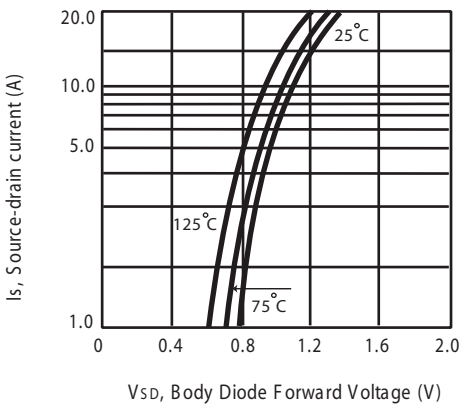


Figure 8. Body Diode Forward Voltage Variation with Source Current

Typical Characteristics

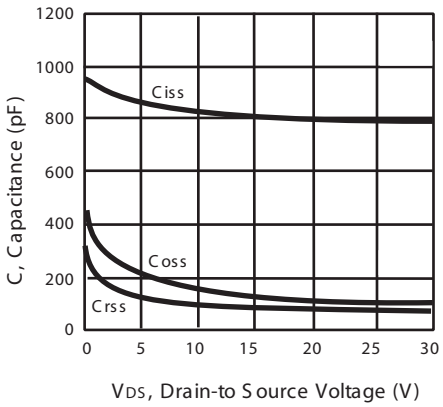


Figure 9. Capacitance

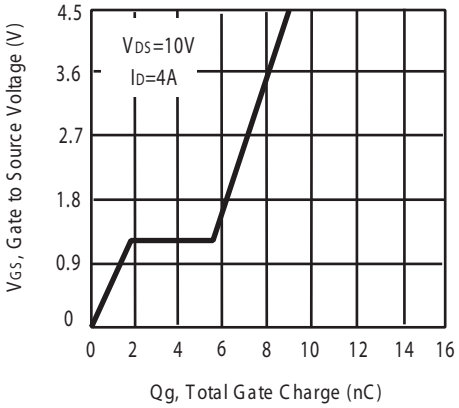


Figure 10. Gate Charge

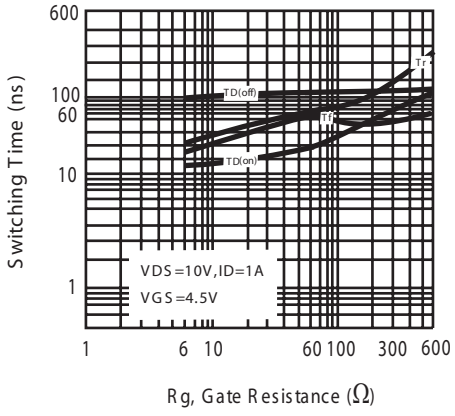
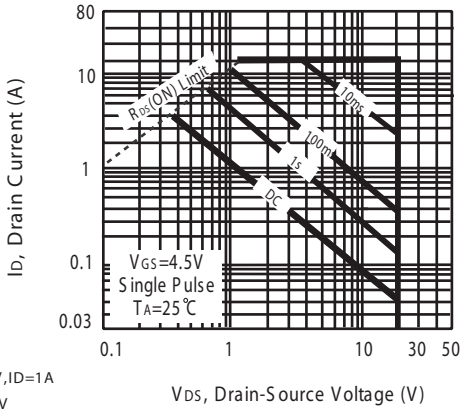


Figure 11.switching characteristics



VDS=10V,ID=1A
VGS=4.5V

Figure 12. Maximum Safe Operating Area

Typical Characteristics

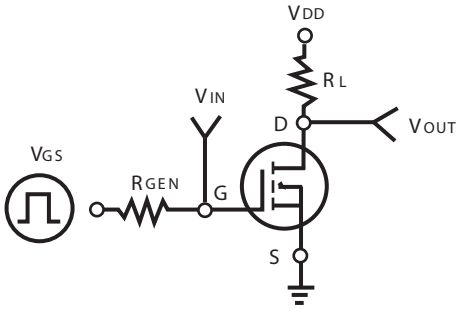


Figure 11. Switching Test Circuit

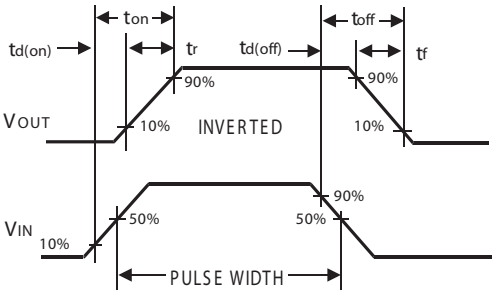
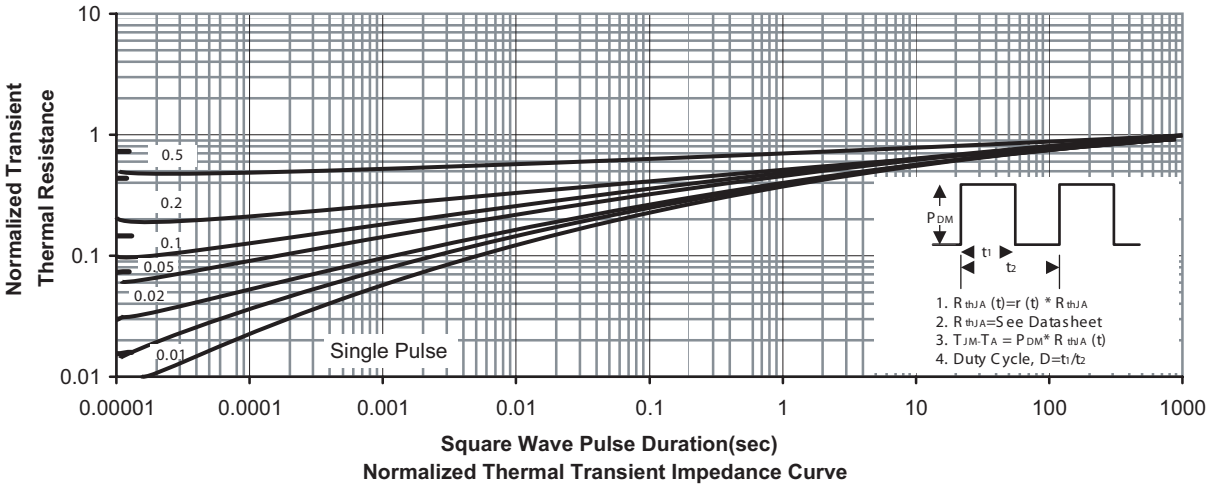


Figure 12. Switching Waveforms



Normalized Thermal Transient Impedance Curve