

Description

The 2312 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a battery protection or in other switching application.

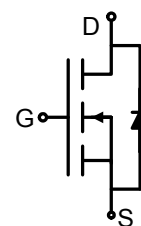
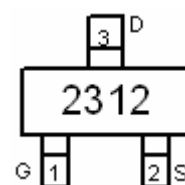
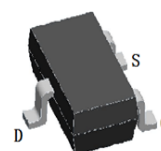
General Features

V_{DSS}	$R_{DS(ON)}$ @4.5V (Typ)	$R_{DS(ON)}$ @2.5V (Typ)	I_D
20V	15m Ω	18m Ω	6.8A

- High power and current handling capability
- RoHS Compliant
- Surface mount package

Application

- Battery protection
- Load switch
- Power management

**Schematic diagram****Marking and pin assignment****SOT-23****Ordering Information**

Part Number	Marking	Case	Packaging
2312	2312	SOT-23	3000pcs/Reel

Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 10	V
Continuous Drain Current	I_D	6.8	A
		5.4	
Drain Current-Pulsed (Note 1)	I_{DM}	20	A
Maximum Power Dissipation	P_D	1.25	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	100	$^\circ\text{C/W}$
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Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	20	22	-	V

Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =20V,V _{GS} =0V	-	-	0.3	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±10V,V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	0.5	0.65	0.9	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =2.5V, I _D =4.0 A	-	18	30	mΩ
		V _{GS} =4.5V, I _D =4.5A	-	15	21	mΩ
Forward Transconductance	g _{FS}	V _{DS} =10V,I _D =4A	-	10	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =8V,V _{GS} =0V, F=1.0MHz	-	500	-	PF
Output Capacitance	C _{oss}		-	300	-	PF
Reverse Transfer Capacitance	C _{rss}		-	140	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =10V,I _D =1A V _{GS} =4.5V,R _{GEN} =6Ω	-	20	40	nS
Turn-on Rise Time	t _r		-	18	40	nS
Turn-Off Delay Time	t _{d(off)}		-	60	108	nS
Turn-Off Fall Time	t _f		-	28	56	nS
Total Gate Charge	Q _g	V _{DS} =10V,I _D =3A,V _{GS} =4.5V	-	10	15	nC
Gate-Source Charge	Q _{gs}		-	2.3	-	nC
Gate-Drain Charge	Q _{gd}		-	2.9	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V,I _S =1A	-	-	1.2	V
Diode Forward Current (Note 2)	I _S		-	-	1	A

Notes:

1. Repetitive rating: pulse width limited by maximum junction temperature.
2. Surface mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

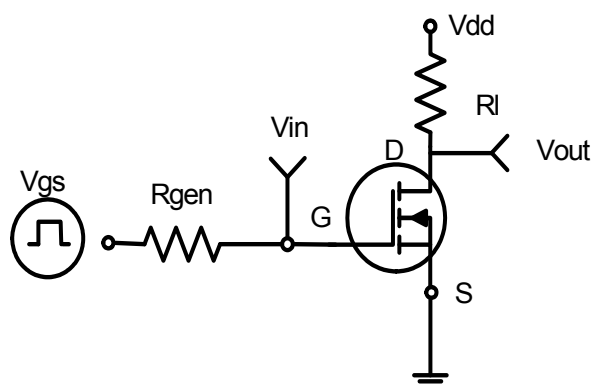


Figure 1: Switching Test Circuit

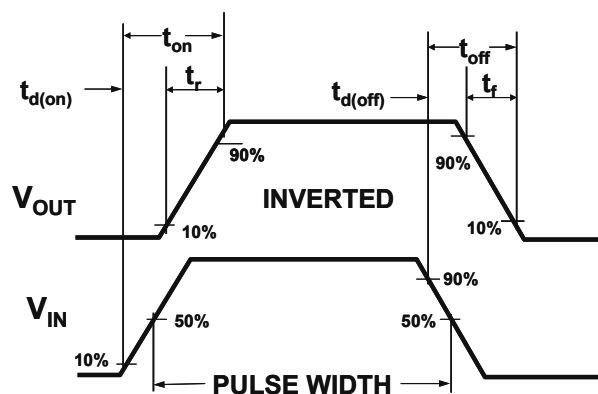


Figure 2: Switching Waveforms

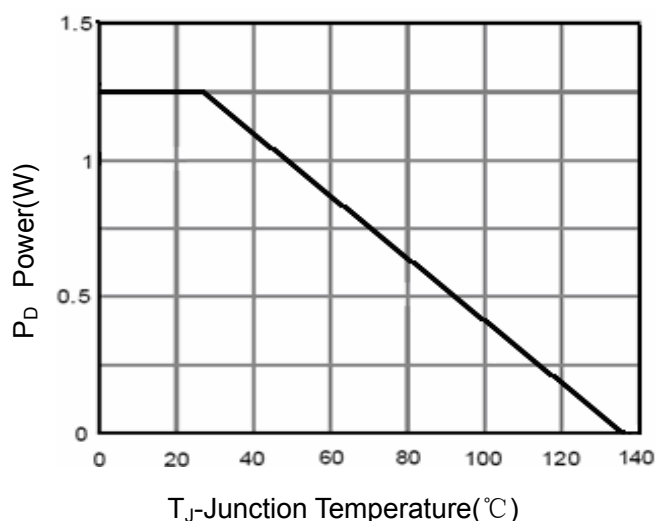


Figure 3 Power Dissipation

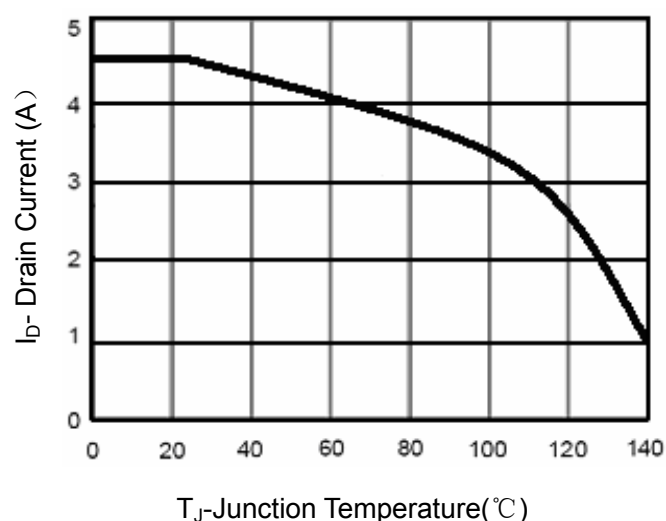


Figure 4 Drain Current

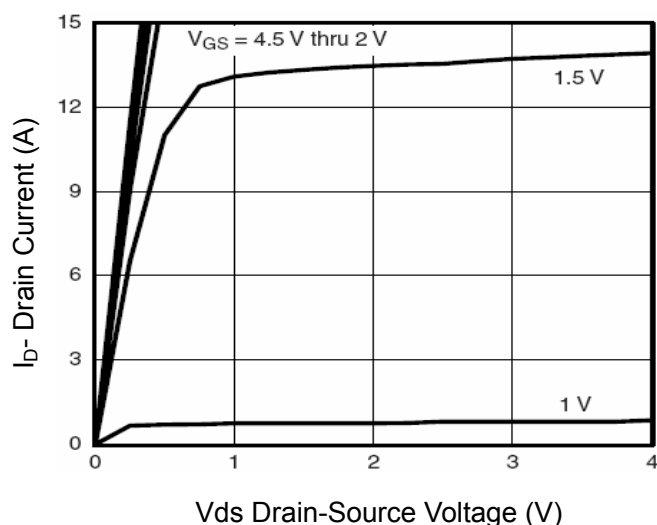


Figure 5 Output CHARACTERISTICS

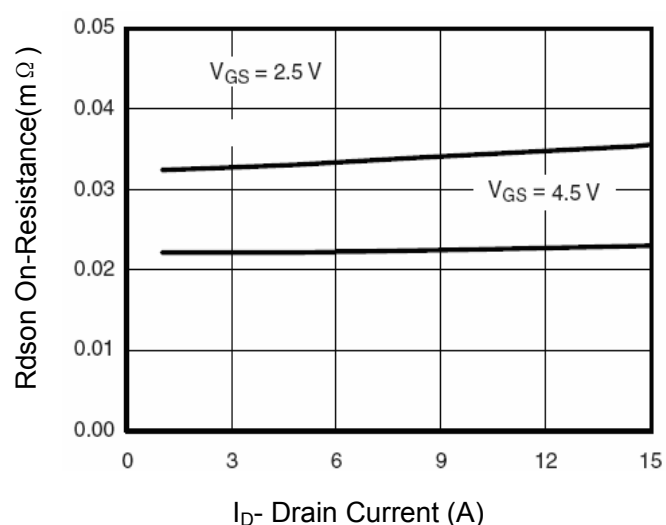


Figure 6 Drain-Source On-Resistance

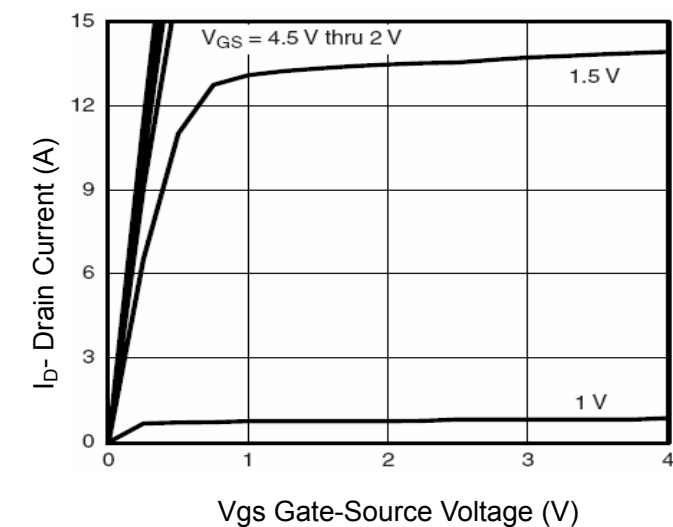


Figure 7 Transfer Characteristics

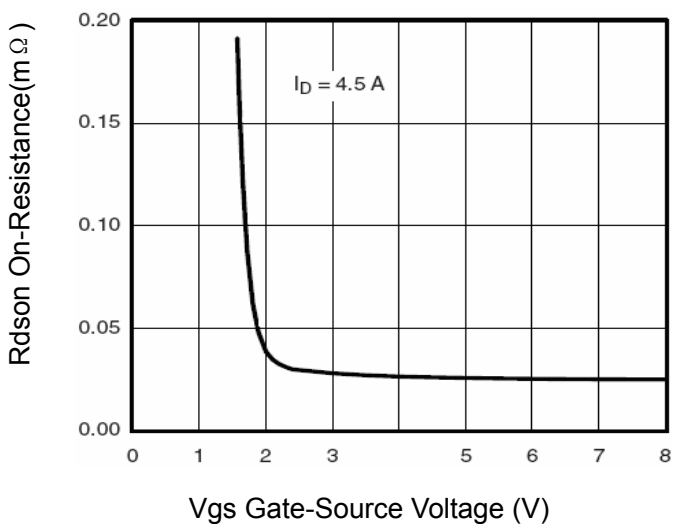


Figure 9 Rdson vs Vgs

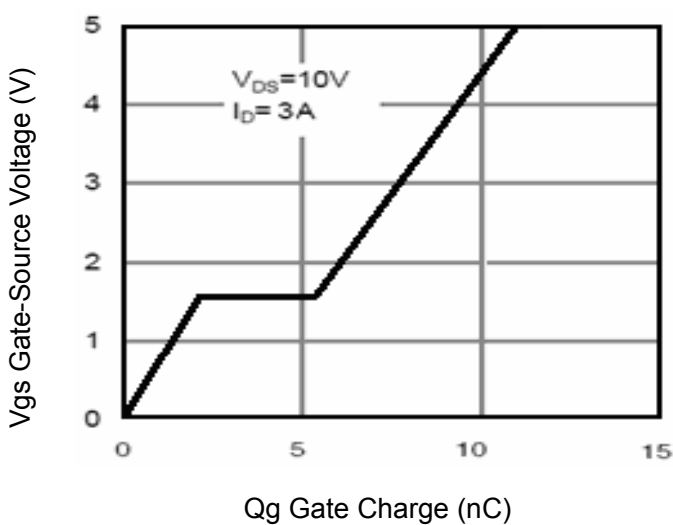


Figure 11 Gate Charge

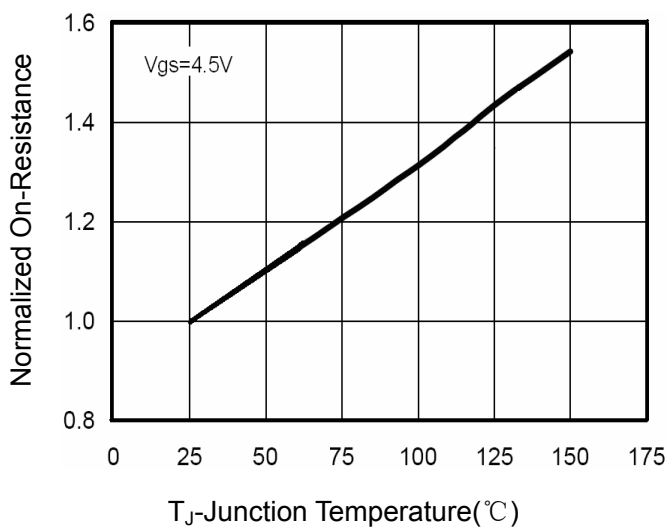


Figure 8 Drain-Source On-Resistance

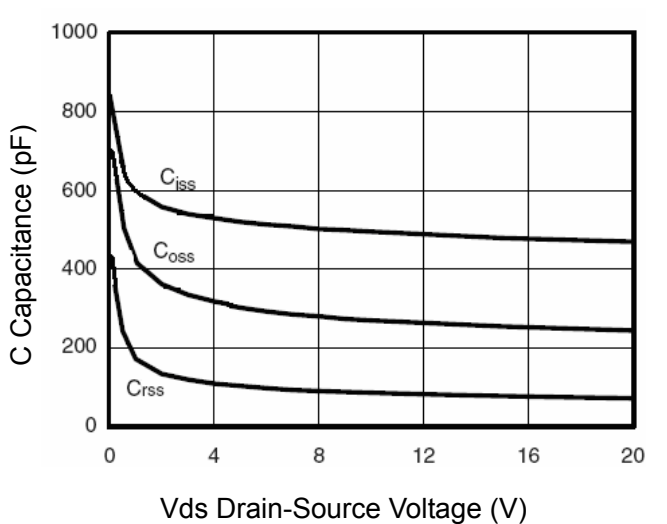


Figure 10 Capacitance vs Vds

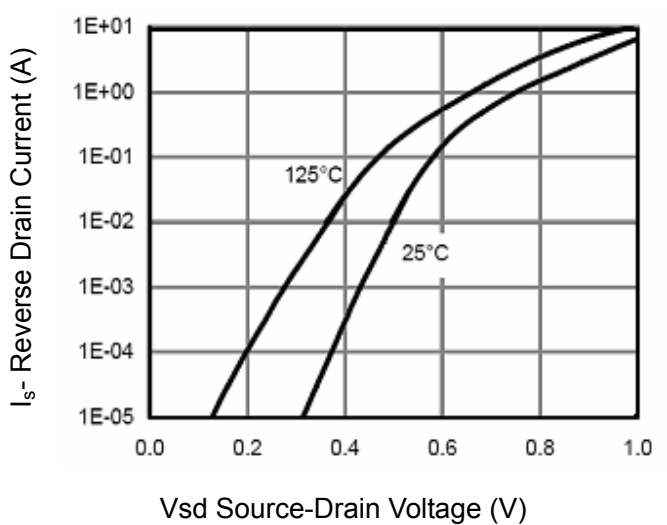


Figure 12 Source- Drain Diode Forward

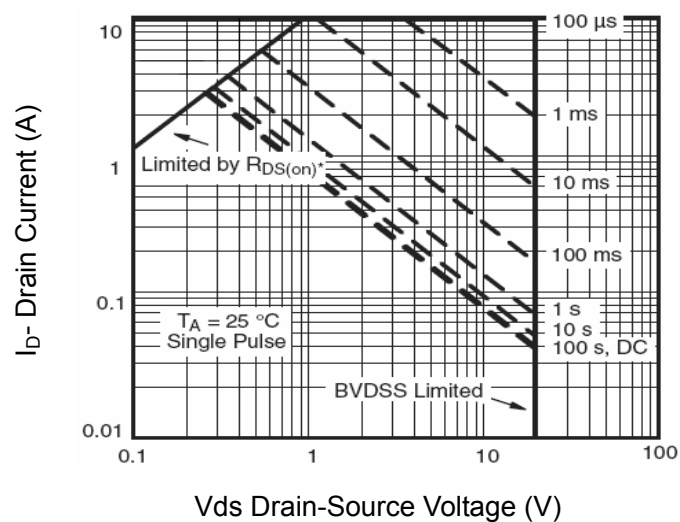


Figure 13 Safe Operation Area

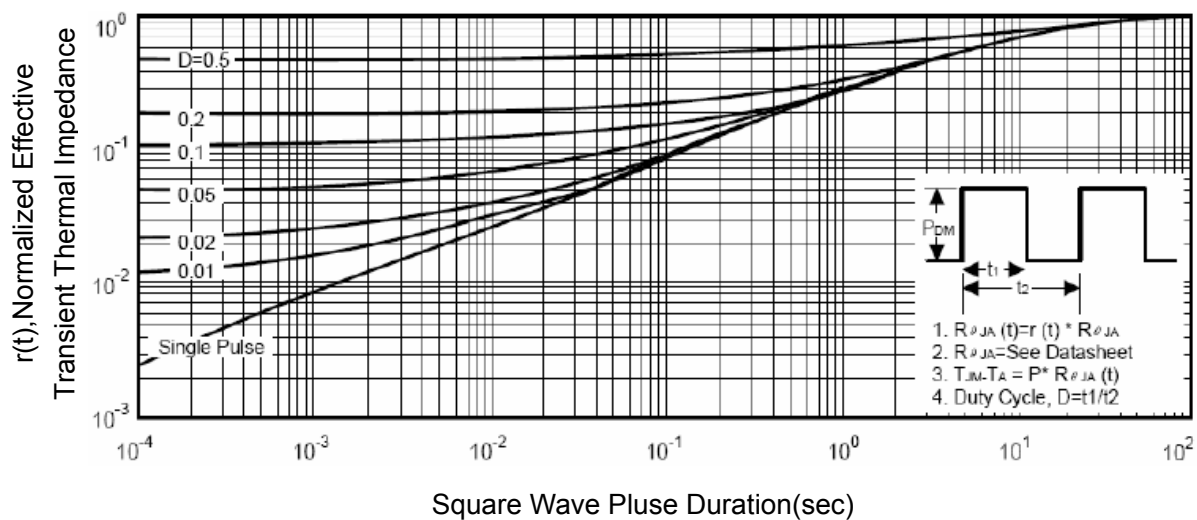
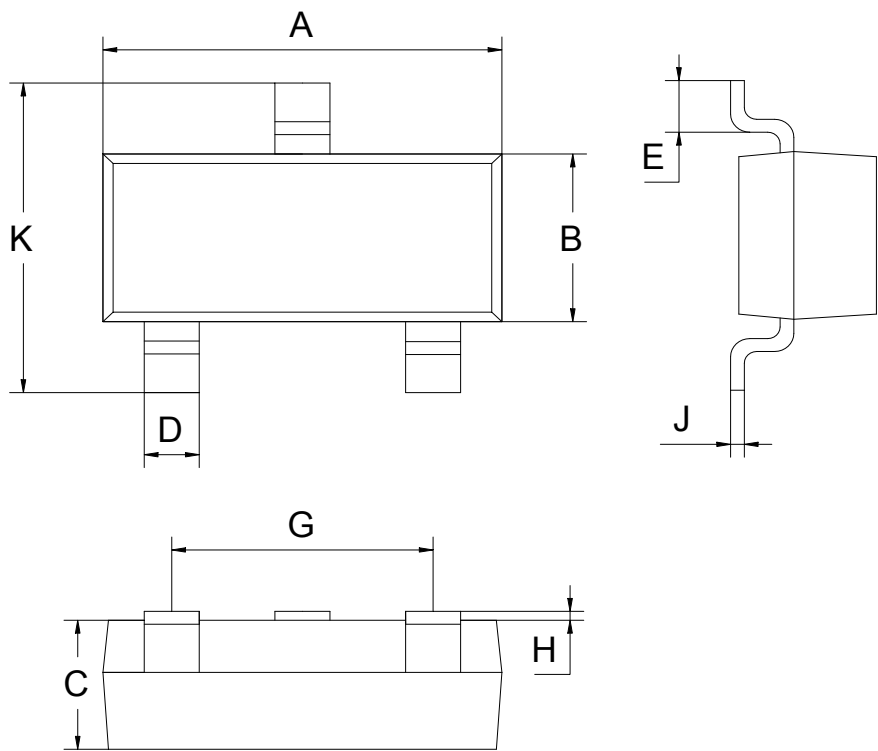


Figure 14 Normalized Maximum Transient Thermal Impedance

SOT-23 Package information



SOT-23			
Dim	MIN	NOM	MAX
A	2.80	2.90	3.00
B	1.20	1.30	1.40
C	0.90	1.00	1.10
D	0.39	0.40	0.45
E	0.20MIN		
G	1.90REF		
H	0.00	-	0.10
J	0.05	0.10	0.15
K	2.30	2.40	2.50
All Dimensions in mm			