



Description

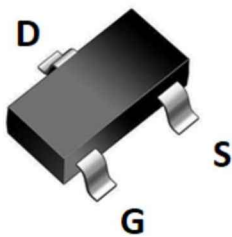
N-channel Enhancement Mode Power MOSFET

Features

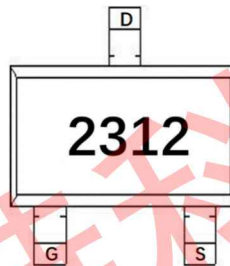
- 20V, 6.8A
 $R_{DS(ON)} < 21m\Omega$ @ $V_{GS} = 4.5V$
 $R_{DS(ON)} < 30m\Omega$ @ $V_{GS} = 2.5V$
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired

Application

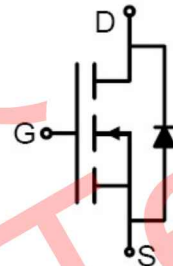
- Load Switch
- PWM Application
- Power management



SOT-23 top view



Marking and pin Assignment



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
2312	JMTL2312A	TAPING	SOT-23	7inch	3000	180000

Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise specified)

Symbol	Parameter		Max.	Units
V _{DSS}	Drain-Source Voltage		20	V
V _{GSS}	Gate-Source Voltage		±10	V
I _D	Continuous Drain Current	T _A = 25°C	6.8	A
		T _A = 100°C	4.4	A
I _{DM}	Pulsed Drain Current ^{note1}		27.2	A
P _D	Power Dissipation	T _A = 25°C	1.6	W
R _{θJA}	Thermal Resistance, Junction to Case		78	°C/W
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +150	°C



Electrical Characteristics ($T_J=25^{\circ}\text{C}$ 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,	-	-	1.0	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	0.5	0.7	1.0	V
R _{DS(on)}	Static Drain-Source on-Resistance note2	V _{GS} =4.5V, I _D =4A	-	16	21	mΩ
		V _{GS} =2.5V, I _D =3A	-	20	30	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f = 1.0MHz	-	780	-	pF
C _{oss}	Output Capacitance		-	140	-	pF
C _{rss}	Reverse Transfer Capacitance		-	80	-	pF
Q _g	Total Gate Charge	V _{DS} =10V, I _D =3.5A, V _{GS} =4.5V	-	11	-	nC
Q _{gs}	Gate-Source Charge		-	2.3	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	2.9	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =10V, I _D =3.5A, R _{GEN} =3Ω, V _{GS} =4.5V	-	9	-	ns
t _r	Turn-on Rise Time		-	30	-	ns
t _{d(off)}	Turn-off Delay Time		-	35	-	ns
t _f	Turn-off Fall Time		-	10	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	6.8	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	27.2	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S =6.8A	-	-	1.2	V

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

2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$



Typical Performance Characteristics

Figure1: Output Characteristics

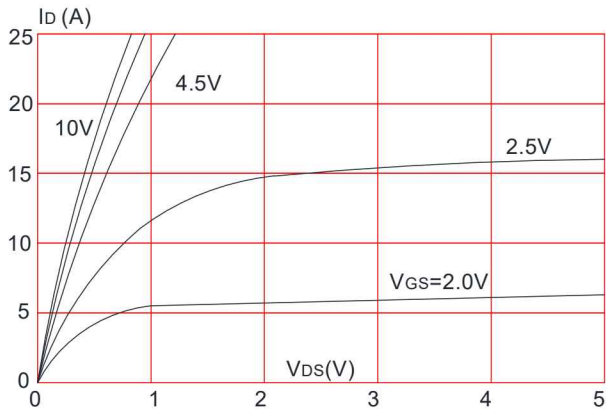


Figure 2: Typical Transfer Characteristics

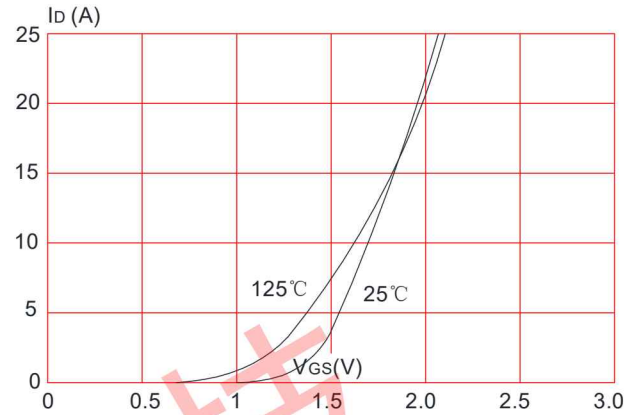


Figure 3: On-resistance vs. Drain Current

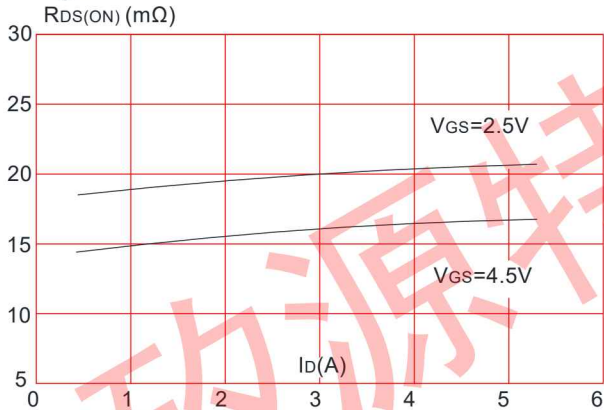


Figure 4: Body Diode Characteristics

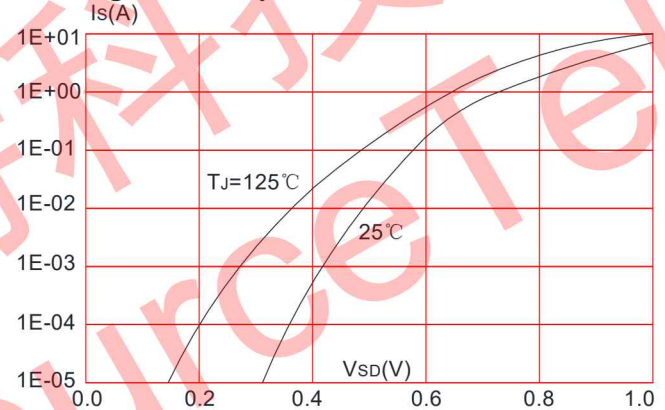


Figure 5: Gate Charge Characteristics

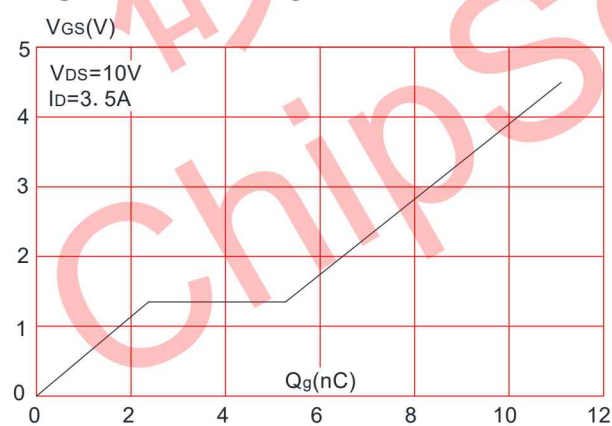


Figure 6: Capacitance Characteristics

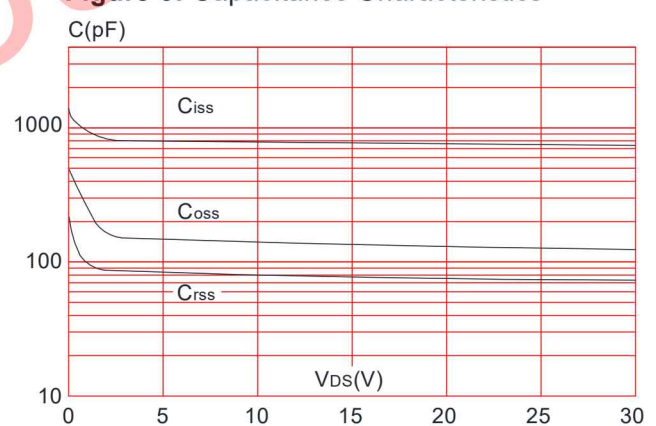




Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

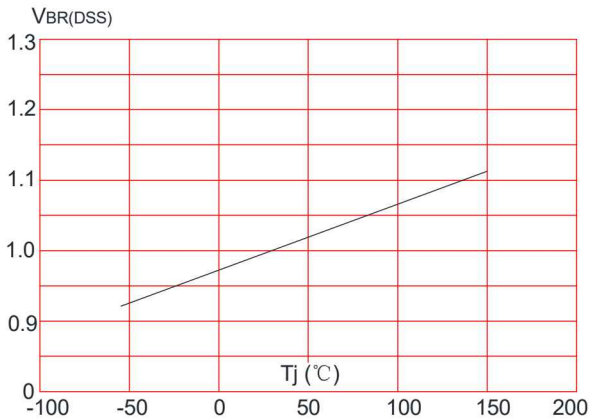


Figure 8: Normalized on Resistance vs. Junction Temperature

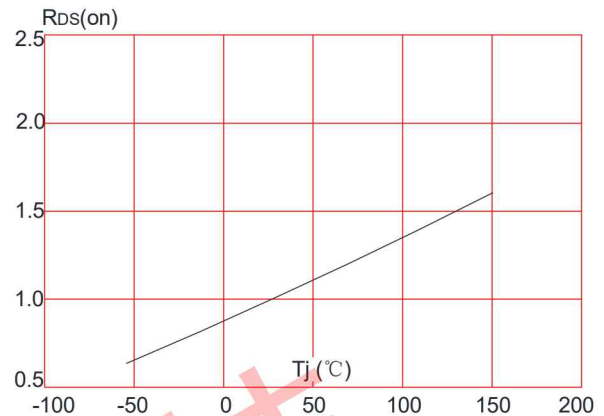


Figure 9: Maximum Safe Operating Area

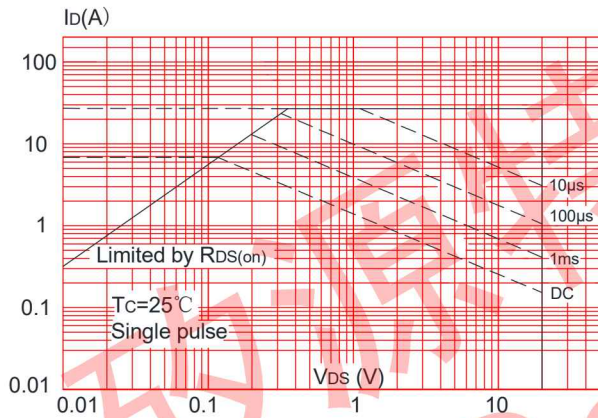


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

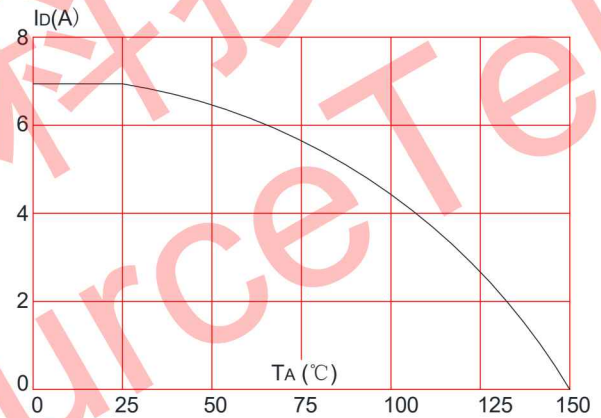
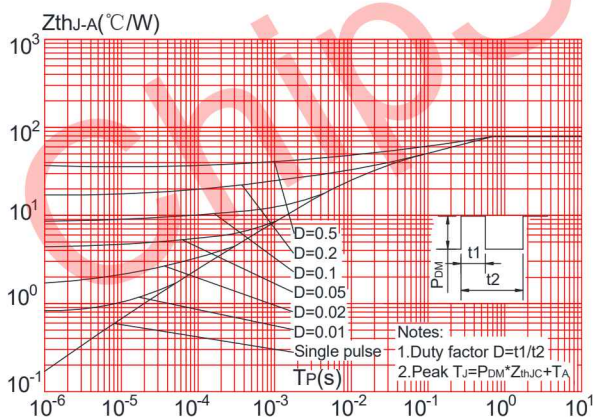


Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient





Test Circuit

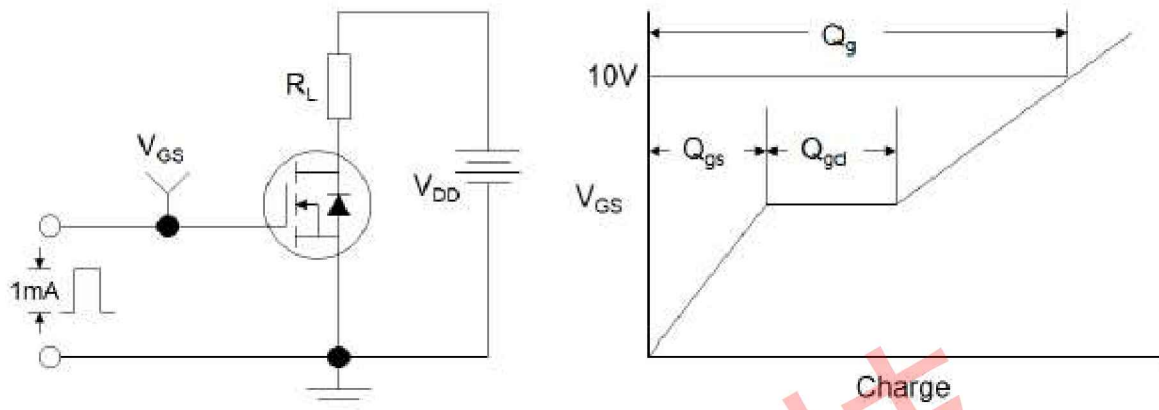


Figure1:Gate Charge Test Circuit & Waveform

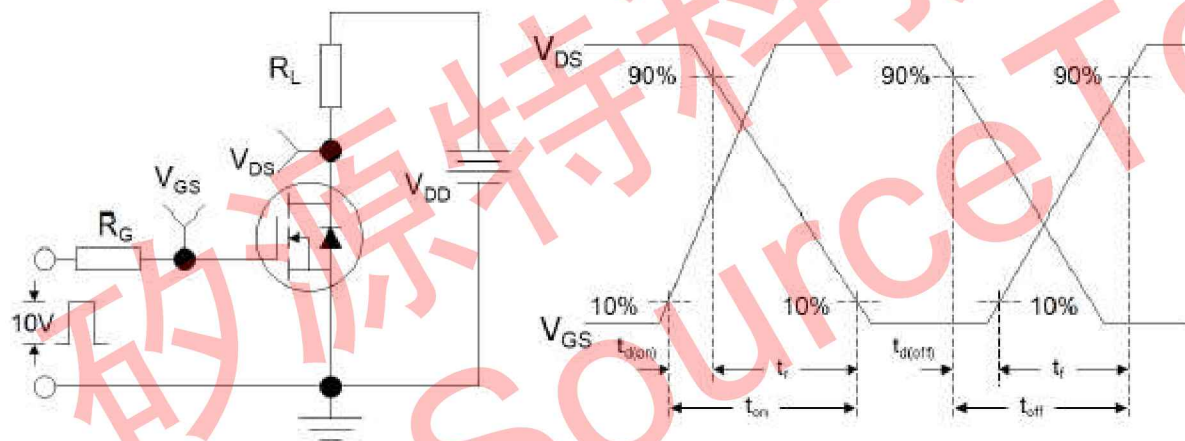


Figure 2: Resistive Switching Test Circuit & Waveforms

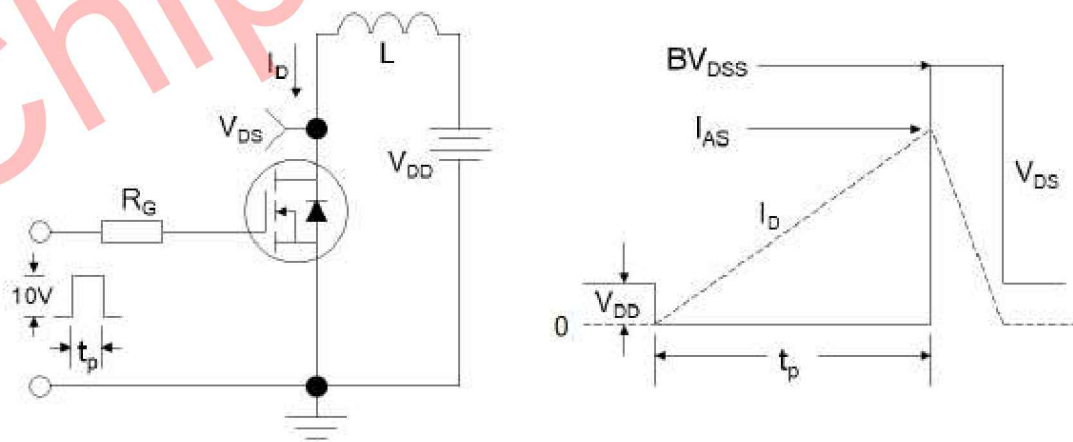
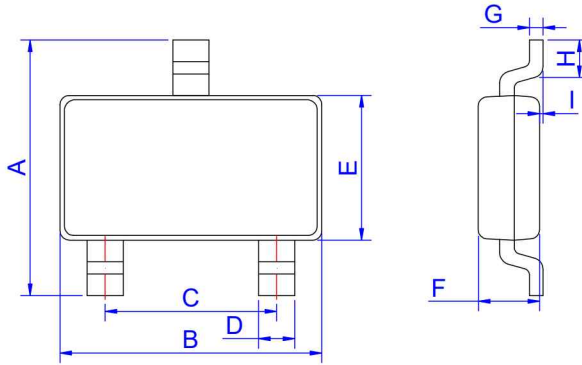


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms



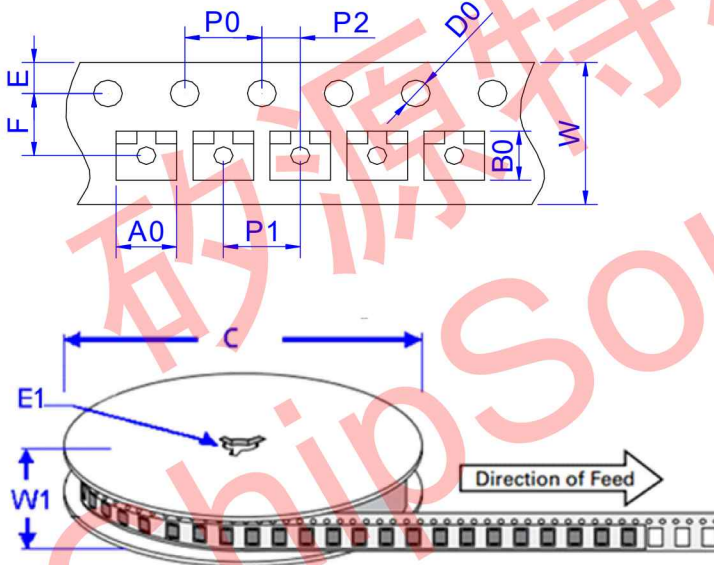
Package Mechanical Data-SOT-23



SOT-23

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.30	2.40	2.50	0.091	0.095	0.098
B	2.80	2.90	3.00	0.110	0.114	0.118
C	1.90 REF			0.075 REF		
D	0.35	0.40	0.45	0.014	0.016	0.018
E	1.20	1.30	1.40	0.047	0.051	0.055
F	0.90	1.00	1.10	0.035	0.039	0.043
G		0.10	0.15		0.004	0.006
H	0.20			0.008		
I	0		0.10	0		0.004

Package Information-SOT-23



Ref.	Dimensions	
	Millimeters	Inches
A0	3.15 ± 0.3	0.124 ± 0.012
B0	2.77 ± 0.3	0.109 ± 0.012
C	178	7.0
D0	1.50±0.1	0.059 ± 0.004
E	1.75 ± 0.2	0.069 ± 0.008
E1	13.3±0.3	0.524± 0.012
F	3.5 ± 0.2	0.138 ± 0.008
P0	4.00 ± 0.2	0.157 ± 0.008
P1	4.00 ± 0.2	0.157 ± 0.008
P2	2.00 ± 0.2	0.079 ± 0.008
W	8.00 ± 0.2	0.315 ± 0.008
W1	11.5±1.0	0.453 ± 0.039