
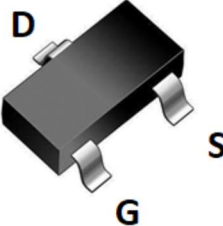
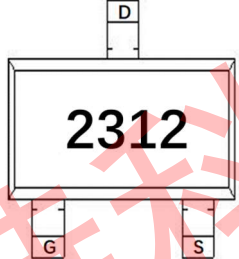
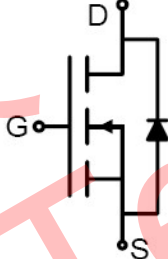




Description

N-channel Enhancement Mode Power MOSFET		
Features <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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	$T_A = 25^\circ C$	6.8 A
		$T_A = 100^\circ C$	4.4 A
I_{DM}	Pulsed Drain Current <small>note1</small>	27.2	A
P_D	Power Dissipation	$T_A = 25^\circ C$	1.6 W
$R_{\theta JA}$	Thermal Resistance, Junction to Case	78	$^\circ C/W$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$



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	$V_{GS}=0V, I_D=250\mu A$	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	$V_{DS}=0V, V_{GS}=\pm 12V$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.7	1.0	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note2</small>	$V_{GS}=4.5V, I_D=4A$	-	16	21	m Ω
		$V_{GS}=2.5V, I_D=3A$	-	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	$V_{DS}=10V,$ $I_D=3.5A, R_{GEN}=3\Omega,$ $V_{GS}=4.5V$	-	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

Figure 1: Output Characteristics

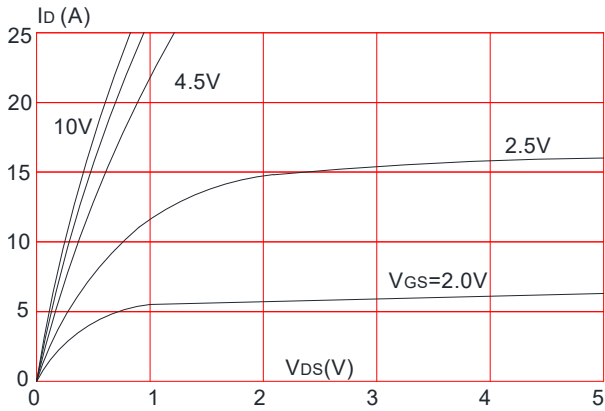


Figure 2: Typical Transfer Characteristics

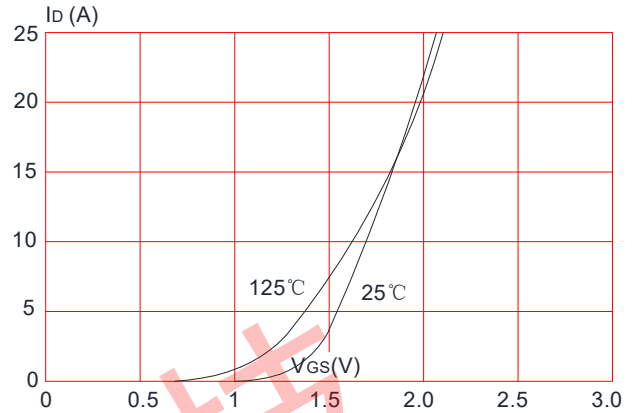


Figure 3: On-resistance vs. Drain Current

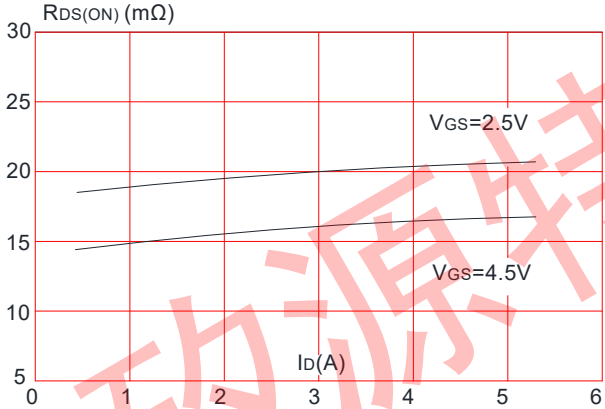


Figure 4: Body Diode Characteristics

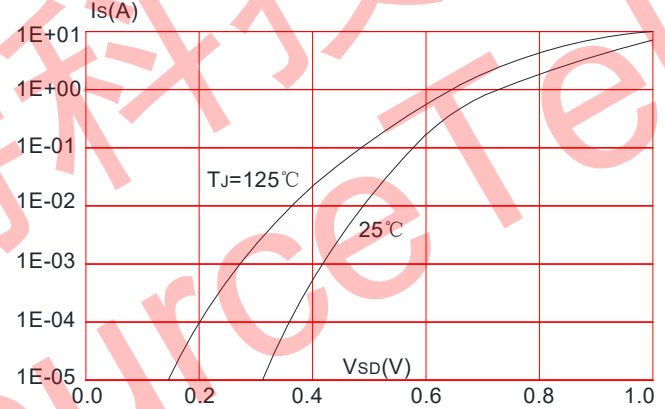


Figure 5: Gate Charge Characteristics

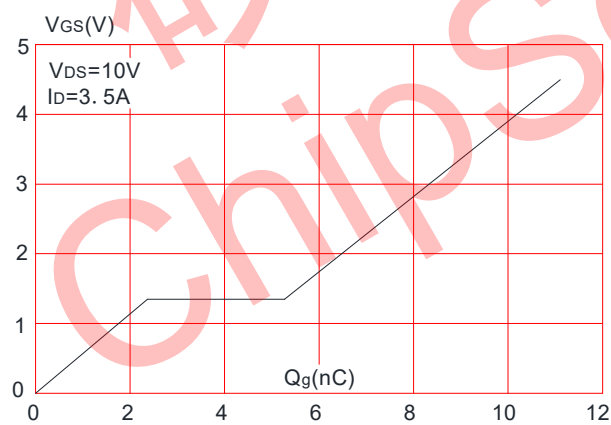


Figure 6: Capacitance Characteristics

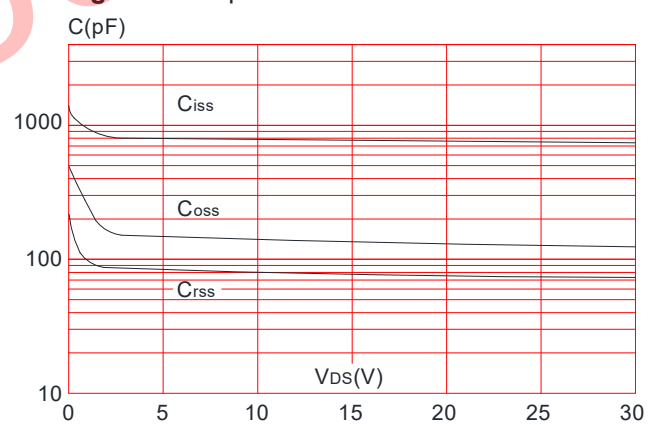




Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

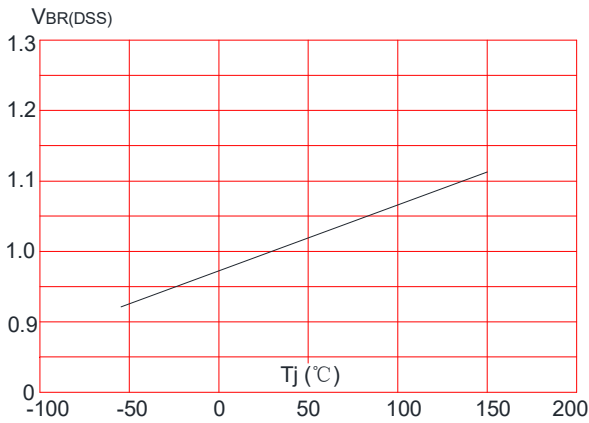


Figure 8: Normalized on Resistance vs. Junction Temperature

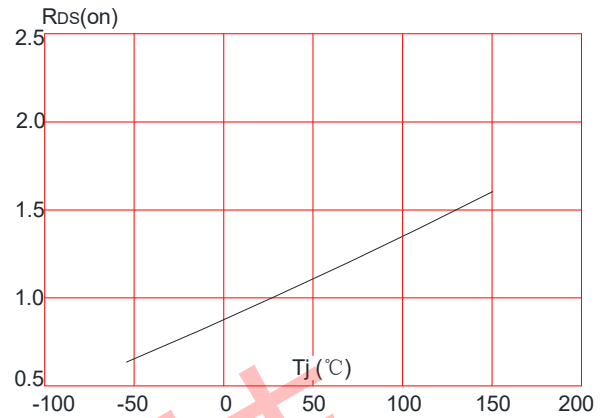


Figure 9: Maximum Safe Operating Area

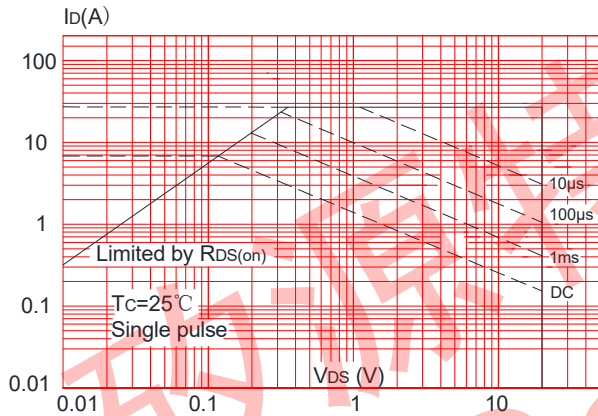


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

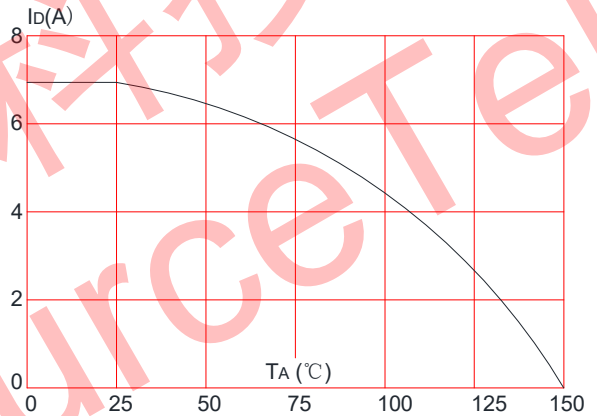
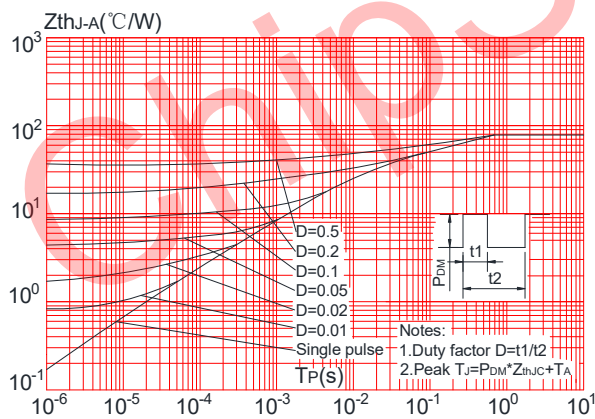


Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient





Test Circuit

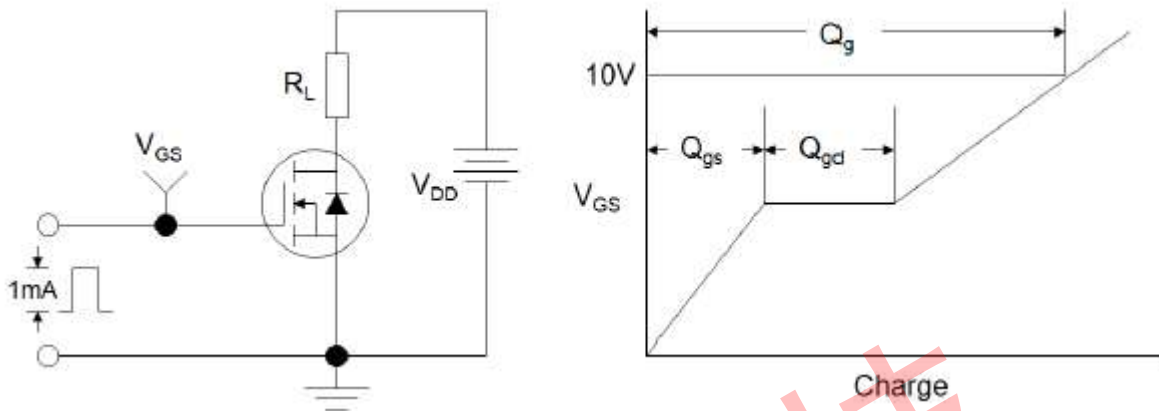


Figure1:Gate Charge Test Circuit & Waveform

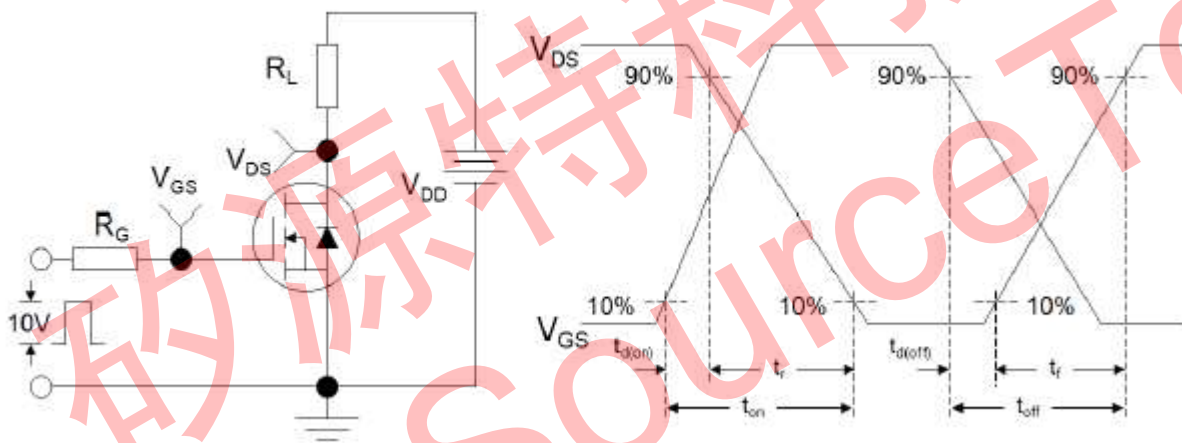


Figure 2: Resistive Switching Test Circuit & Waveforms

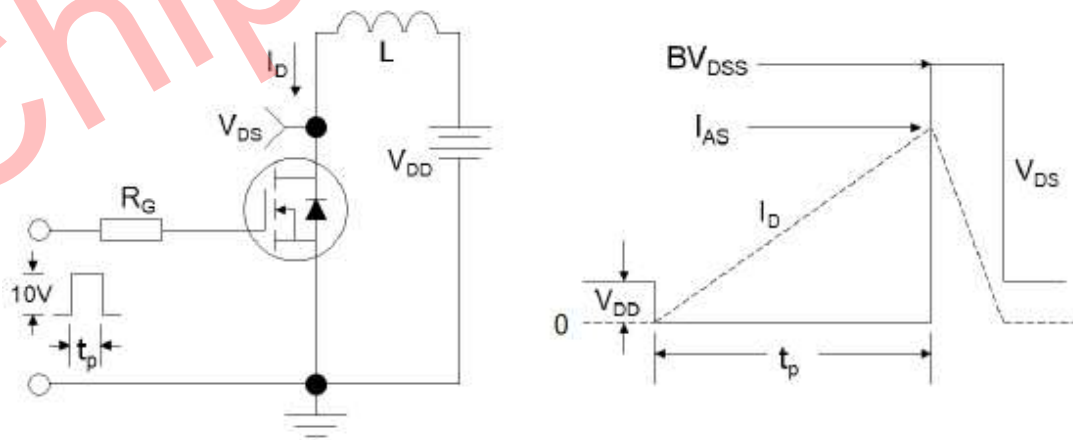
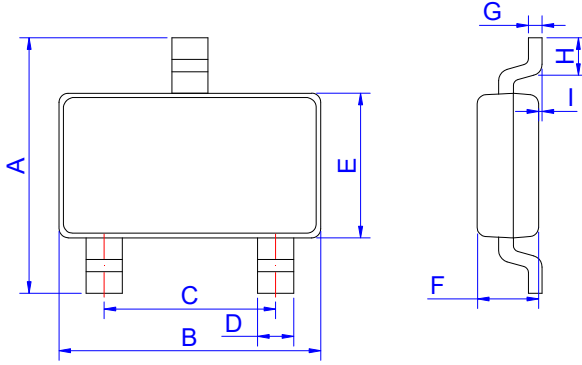


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms



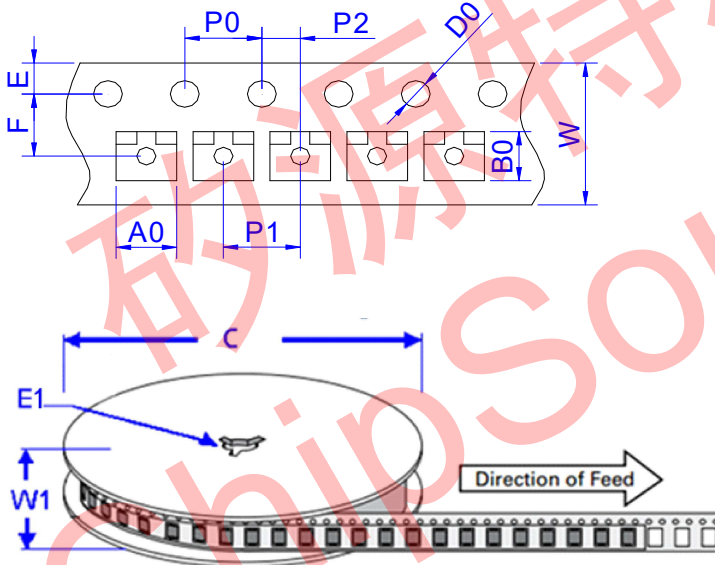
Package Mechanical Data-SOT-23



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