Description

N-channel Enhancement Mode Power MOSFET

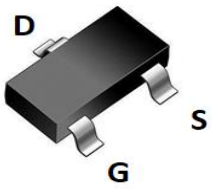
Features

- 20V, 6.8A
  $R_{DS(ON)}$ Typ= 16mΩ @ V_{GS} = 4.5V
  $R_{DS(ON)}$ Typ= 20mΩ @ V_{GS} = 2.5V
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead Free

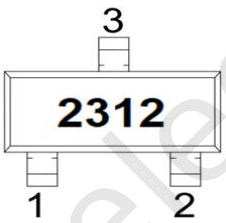
Applications

- Load Switch
- PWM Application
- Power Management

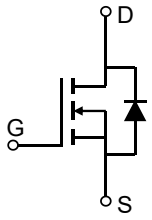
RoHS



SOT-23



Marking and Pin Assignment



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Outline	Package	Reel Size	Reel(pcs)	Per Carton (pcs)
2312	CRMLTU2312A	TAPING	SOT-23	7"	3000	120000

Absolute Maximum Ratings (@ T_J = 25°C unless otherwise specified)

Symbol	Parameter		Value	Units
V_{DS}	Drain-to-Source Voltage		20	V
V_{GS}	Gate-to-Source Voltage		±12	V
I_D	Continuous Drain Current	T_A = 25°C	6.8	A
		T_A = 100°C	4	
I_{DM}	Pulsed Drain Current (1)		27.2	A
P_D	Power Dissipation	T_A = 25°C	1.3	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient(2)		97	°C/W
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 150	°C

Electrical Characteristics (T_J = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 20V, V_{GS} = 0V	-	-	1.0	μA
I_{GSS}	Gate-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	0.75	1.0	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(3)	V_{GS} =4.5V, I_D =4A	-	16	21	mΩ
		V_{GS} =2.5V, I_D = 3A	-	20	30	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 10V, f = 1MHz	-	712	-	pF
C_{oss}	Output Capacitance		-	116	-	pF
C_{rss}	Reverse Transfer Capacitance		-	103	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 4.5V V_{DS} = 10V, I_D = 3A	-	9	-	nC
Q_{gs}	Gate Source Charge		-	1.5	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	2.5	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} =4.5V, V_{DD} = 10V I_D= 3A, R_{GEN} = 3Ω	-	5	-	ns
t_r	Turn-On Rise Time		-	16	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	23	-	ns
t_f	Turn-Off Fall Time		-	7	-	ns
Drain-Source Diode Characteristics and Max 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
trr	Body Diode Reverse Recovery Time	I_F = 3A, di/dt = 100A/us	-	7	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	2	-	nC

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

2. $R_{\theta JA}$ is measured with the device mounted on a $1inch^2$ pad of 2oz copper FR4 PCB

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

Typical Performance Characteristics

Figure 1: Output Characteristics

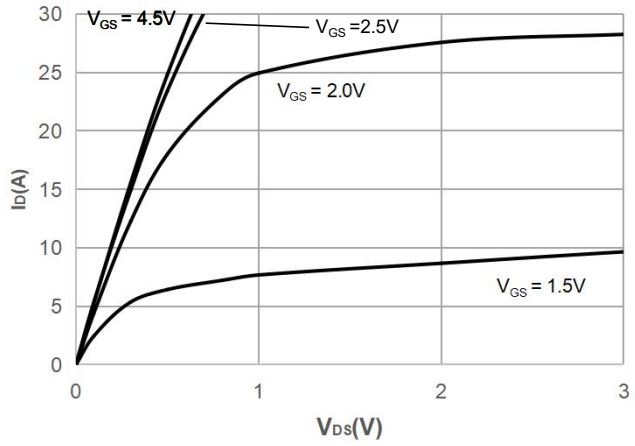


Figure 2: Typical Transfer Characteristics

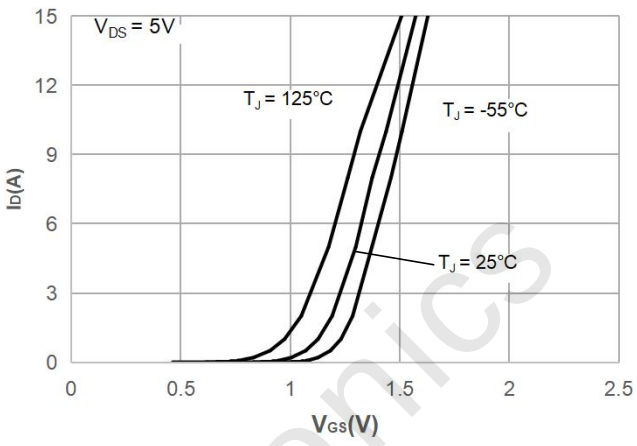


Figure 3: On-resistance vs. Drain Current

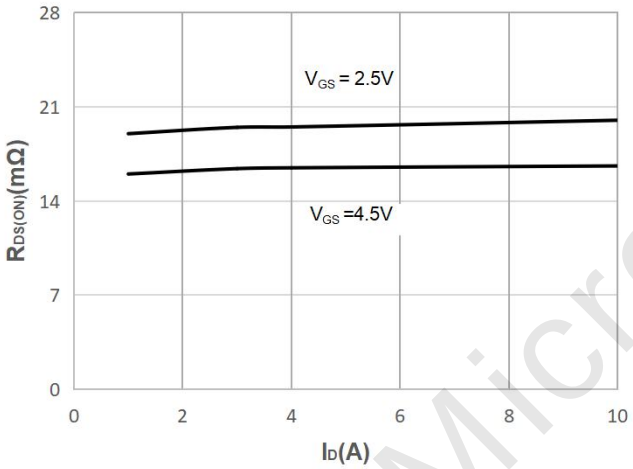


Figure 4: Body Diode Characteristics

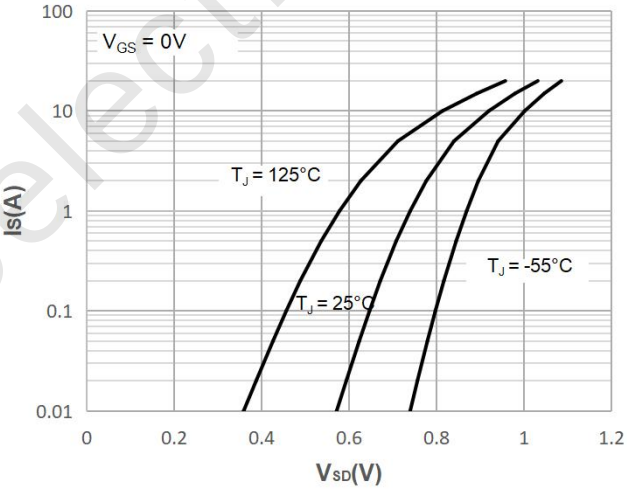


Figure 5: Gate Charge Characteristics

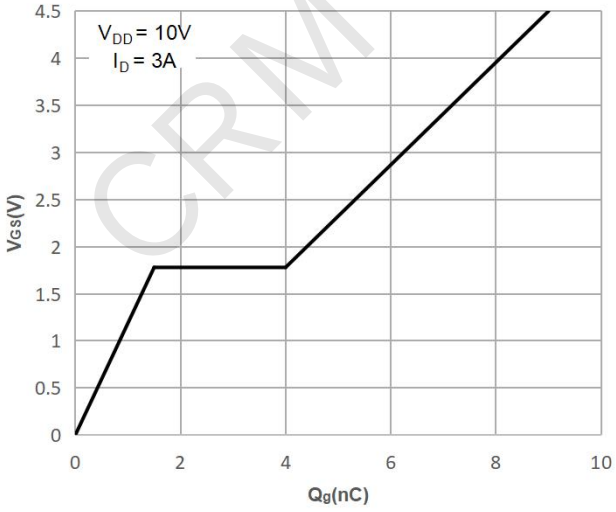
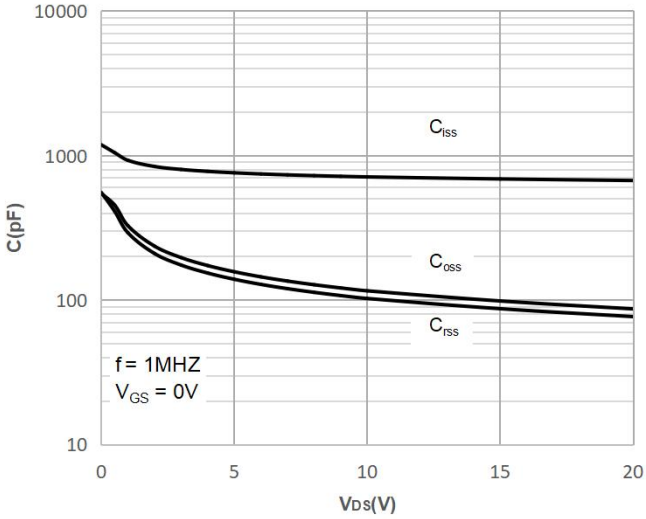


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

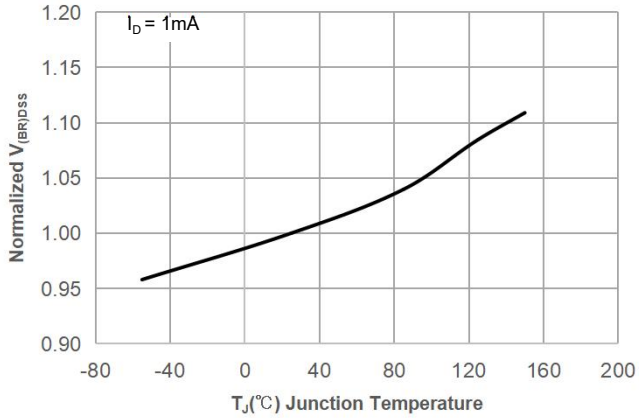


Figure 8: Normalized on Resistance vs. Junction Temperature

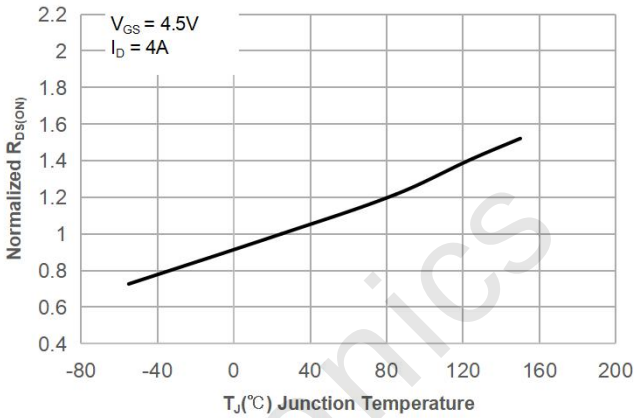


Figure 9: Maximum Safe Operating Area

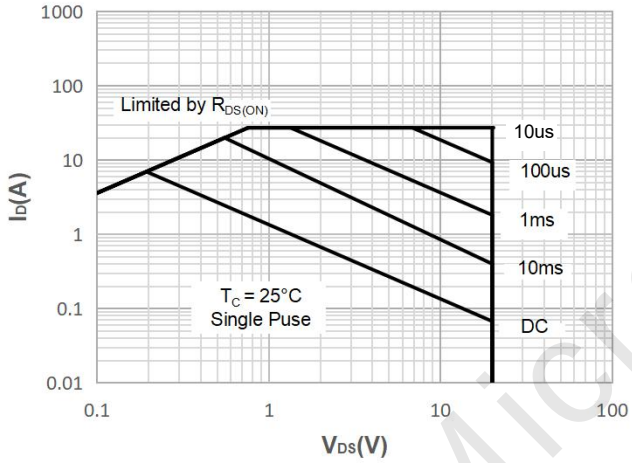


Figure 10: Maximum Continuous Drian Current vs. Case Temperature

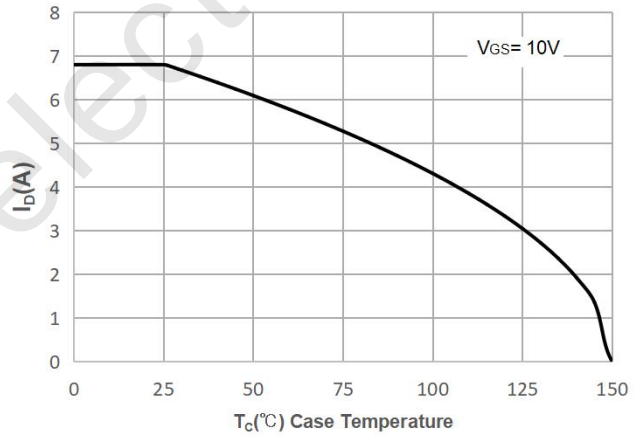


Figure 11: Normalized Maximum Transient Thermal Impedance

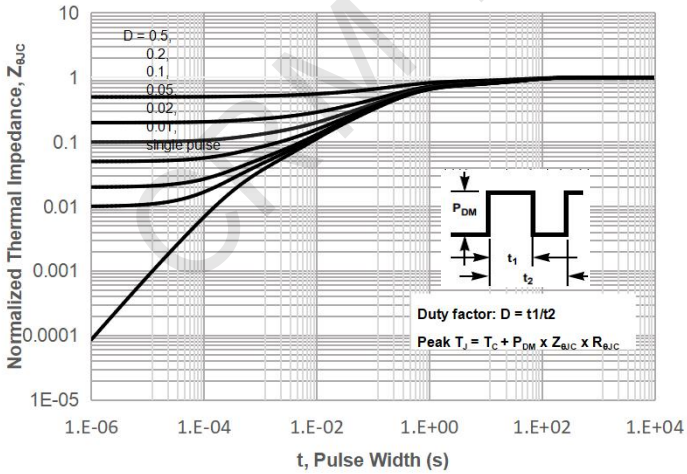
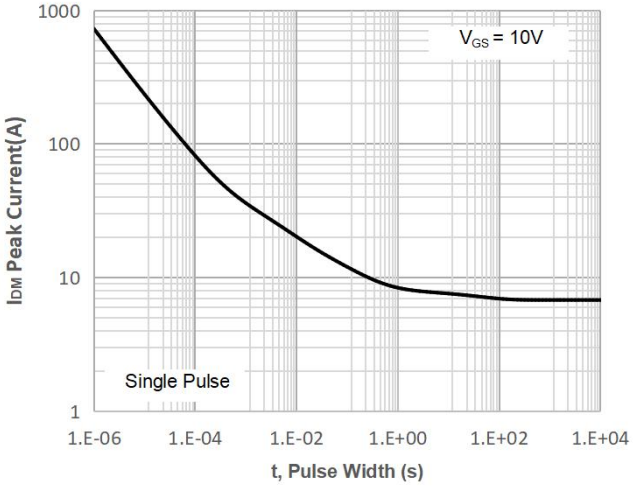


Figure 12: Peak Current Capacity



Test Circuit

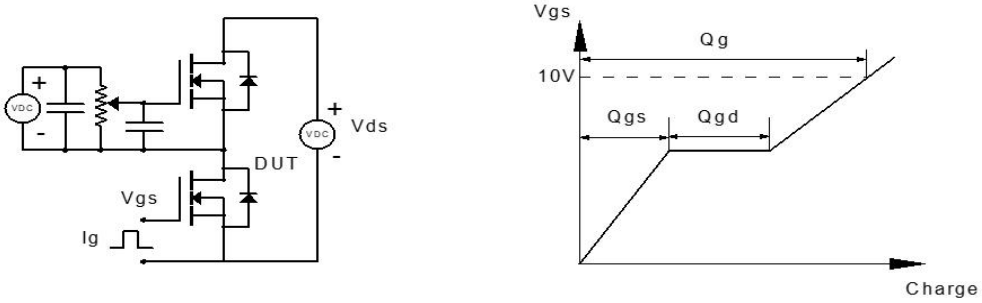


Figure 1: Gate Charge Test Circuit & Waveform

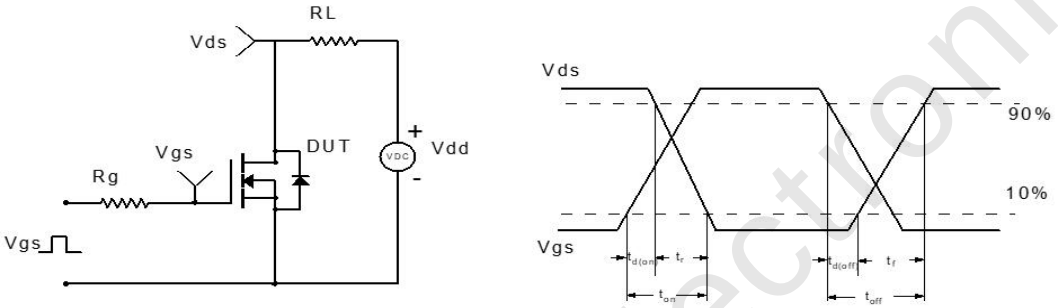


Figure 2: Resistive Switching Test Circuit & Waveform

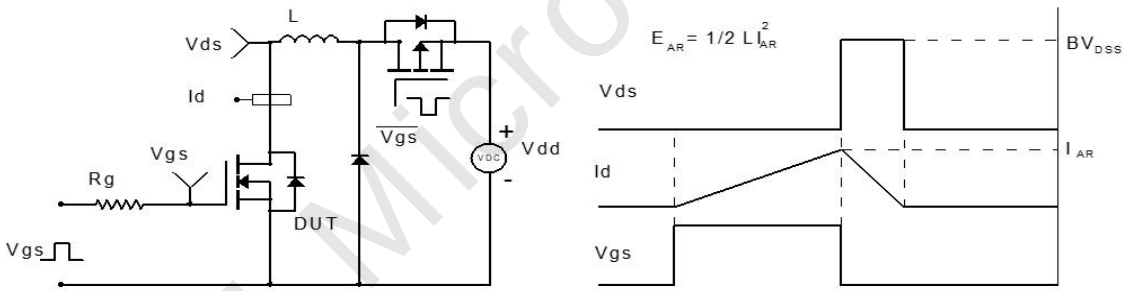


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

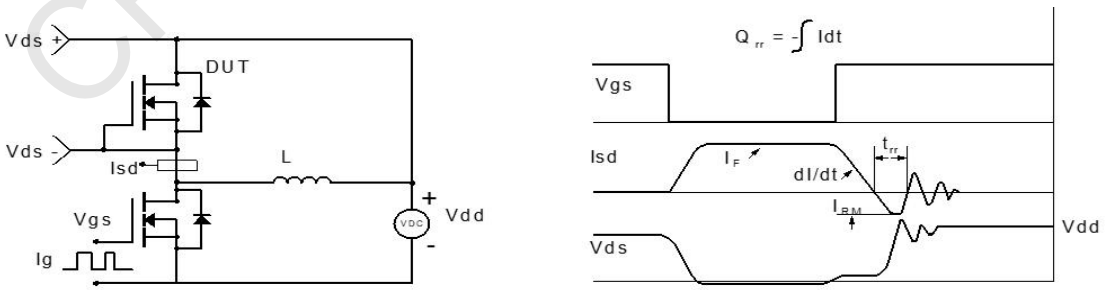
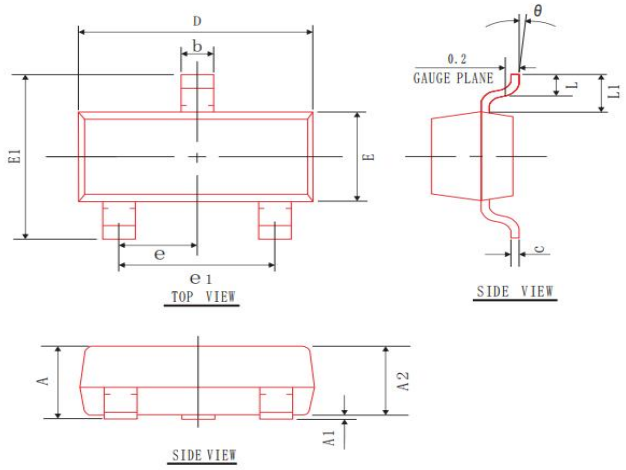


Figure 4: Diode Recovery Test Circuit & Waveform

Package Mechanical Data(SOT-23)



COMMON DIMENSIONS
(UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	0.90	1.05	1.20
A1	0.00	0.05	0.10
A2	0.90	1.00	1.10
b	0.30	0.40	0.50
c	0.08	0.10	0.15
D	2.80	2.90	3.00
E	1.20	1.30	1.40
E1	2.30	2.40	2.50
L	0.30	0.40	0.50
θ	0°	5°	10°
L1	0.55 REF		
e	0.95 BSC		
e1	1.90 REF		