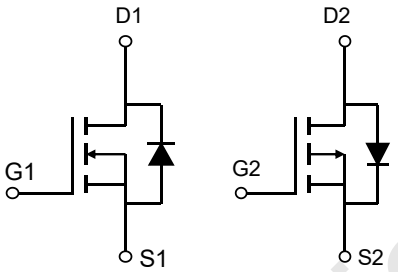
CRMQTU0223AC

N and P Channel Power MOSFET

Description

Features

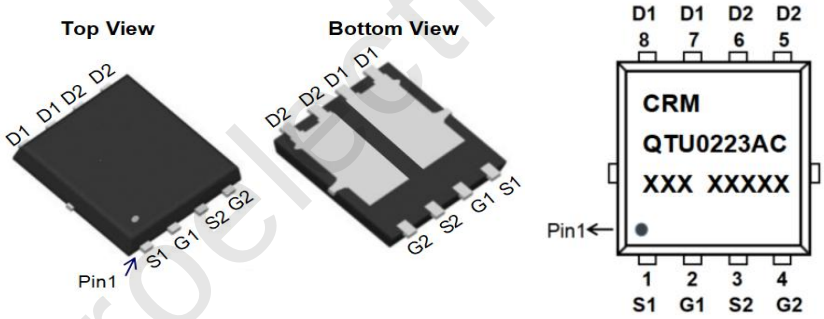
- 20V, 7A
  $R_{DS(ON)}$ Typ = 18mΩ @ V_{GS} = 4.5V
  $R_{DS(ON)}$ Typ = 24mΩ @ V_{GS} = 2.5V
- -20V, -5A
  $R_{DS(ON)}$ Typ = 23mΩ @ V_{GS} = -4.5V
  $R_{DS(ON)}$ Typ = 31mΩ @ V_{GS} = -2.5V
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead Free
- 100% UIS TESTED!
- 100% ΔVds TESTED!



Schematic Diagram

Application

- Load Switch
- PWM Application
- Power Management



Marking and Pin Assignment

Package Marking and Ordering Information

Device	Marking	Package	Outline	Reel Size	Reel (pcs)	Per Carton (pcs)
CRMQTU0223AC	CRMQTU0223AC	PDFN3.3x3.3-8L-D	TAPING	13"	5000	50000

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

Symbol	Parameter		N Value	P Value	Units
V_{DS}	Drain-to-Source Voltage		20	-20	V
V_{GS}	Gate-to-Source Voltage		±12	±12	V
I_D	Continuous Drain Current	T_C = 25°C	7	-5	A
		T_C = 100°C	4.2	-3	A
I_{DM}	Pulsed Drain Current (1)		28	-20	A
E_{AS}	Single Pulsed Avalanche Energy (2)		6.3	10.5	mJ
P_D	Power Dissipation	T_C = 25°C	2.5	2.5	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case		50	50	°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	0.4	0.65	1	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(3)	V_{GS} = 4.5V, I_D = 2A	-	18	24	mΩ
		V_{GS} = 2.5V, I_D = 1.5A	-	24	31	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 10V, f = 1MHz	-	371	-	pF
C_{oss}	Output Capacitance		-	56	-	pF
C_{rss}	Reverse Transfer Capacitance		-	46	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 4.5V V_{DS} = 10V, I_D = 2A	-	6	-	nC
Q_{gs}	Gate Source Charge		-	1	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	1.5	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = 4.5V, V_{DD} = 10V I_D= 2A, R_{GEN} = 3Ω	-	4	-	ns
t_r	Turn-On Rise Time		-	13	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	65	-	ns
t_f	Turn-Off Fall Time		-	33	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	7	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	28	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = 2A	-	-	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

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	-0.4	-0.6	-1	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(3)	V_{GS} = -4.5V, I_D = -3A	-	23	30	mΩ
		V_{GS} = -2.5V, I_D = -2A	-	31	40	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = -10V, f = 1MHz	-	613	-	pF
C_{oss}	Output Capacitance		-	108	-	pF
C_{rss}	Reverse Transfer Capacitance		-	86	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to -4.5V V_{DS} = -10V, I_D = -5A	-	15	-	nC
Q_{gs}	Gate Source Charge		-	1.8	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	2.8	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = -4.5V, V_{DD} = -10V I_D= -5A, R_{GEN} = 6Ω	-	4.5	-	ns
t_r	Turn-On Rise Time		-	9.2	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	18.7	-	ns
t_f	Turn-Off Fall Time		-	3.3	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-5	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-20	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = -3A	-	-	-1.2	V
trr	Body Diode Reverse Recovery Time	I_F = -3A, di/dt = 100A/us	-	4	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	24.5	-	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. E_{AS} condition: Starting T_J=25°C, V_{DD}=10V, V_G=10V, R_G=25ohm, L=0.5mH, I_{AS}=5A

   E_{AS} condition: Starting T_J=25°C, V_{DD}=-10V, V_G=-10V, R_G=25ohm, L=0.5mH, I_{AS}=-6.5A
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

Test Circuit

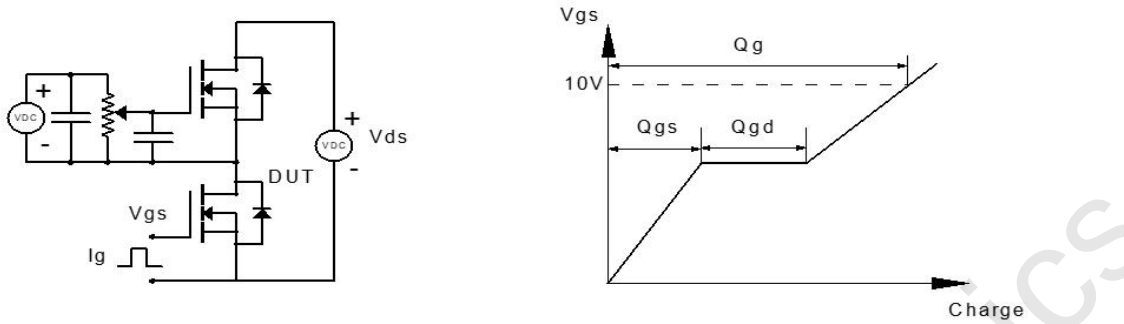


Figure 1: Gate Charge Test Circuit & Waveform

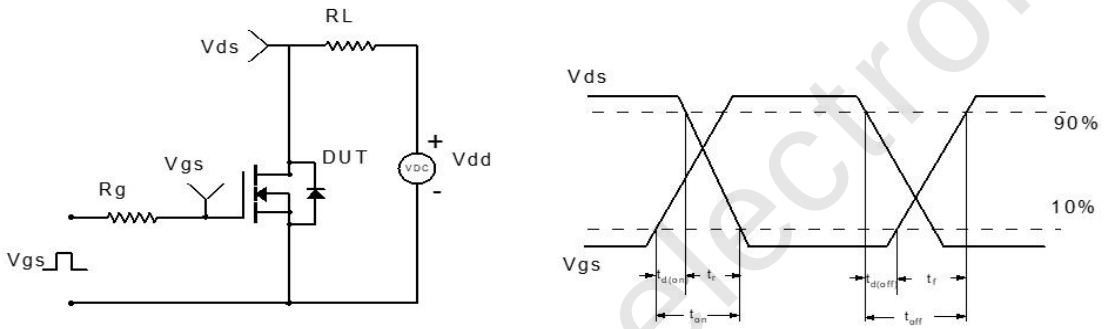


Figure 2: Resistive Switching Test Circuit & Waveform

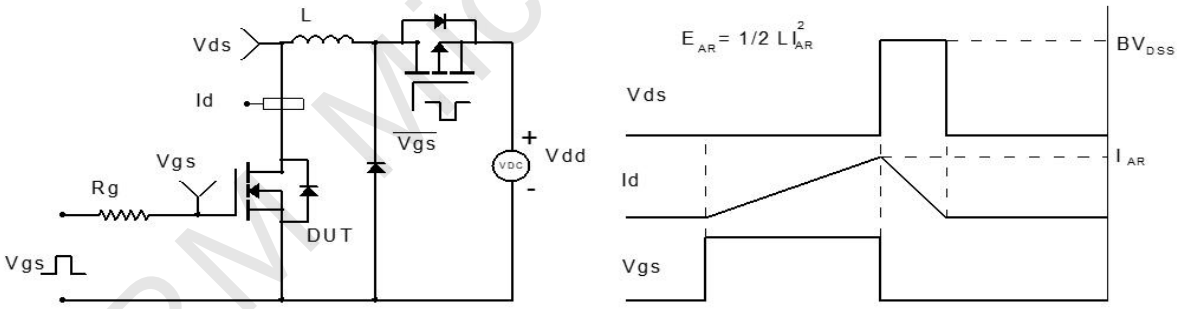


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

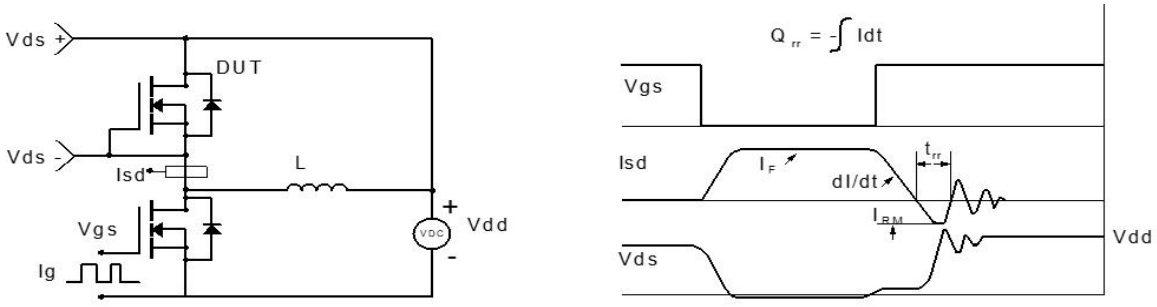
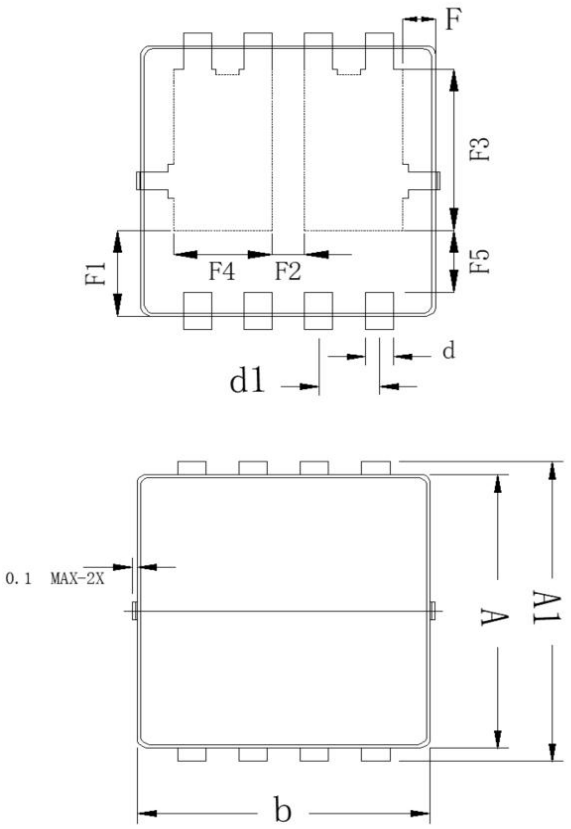
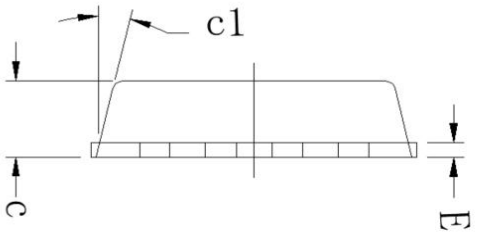


Figure 4: Diode Recovery Test Circuit & Waveform

Package Mechanical Data(PDFN3.3x3.3-8L-D)





COMMON DIMENSION (MM)			
PKG	PDFN 3.3×3.3-8L-D		
SYMBOL	MIN	TYP	MAX
A	3.070	3.100	3.130
A1	3.300	3.400	3.500
b	3.070	3.100	3.130
c	0.770	0.800	0.830
c1	–	13°	–
d	0.275	0.300	0.325
d1	0.625	0.650	0.675
E	0.144	0.152	0.160
F	0.300	0.325	0.350
F1	0.960	0.985	1.010
F2	0.355	0.380	0.405
F3	1.775	1.800	1.825
F4	1.010	1.035	1.060
F5	0.660	0.685	0.710

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