Description

N and P-channel Enhancement Mode Power MOSFET

Features

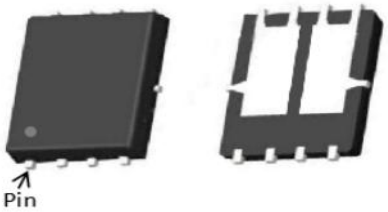
- N-Channel: 44V, 12A
  - $R_{DS(ON)}$ Typ = 17.4mΩ @ V_{GS} = 10V
  - $R_{DS(ON)}$ Typ = 20.7mΩ @ V_{GS} = 4.5V
- P-Channel: -40V, -12A
  - $R_{DS(ON)}$ Typ = 46mΩ @ V_{GS} = -10V
  - $R_{DS(ON)}$ Typ = 58mΩ @ V_{GS} = -4.5V
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead Free

Applications

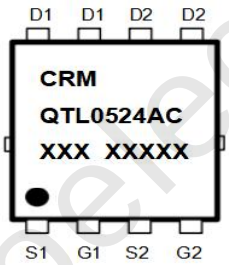
- Battery Protection
- Load Switch
- Power Management

100% UIS TESTED!
100% ΔVds TESTED!

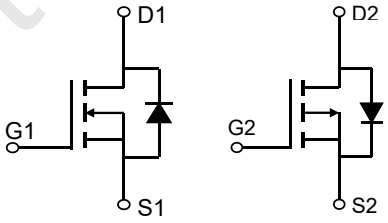
RoHS



PDFN3.3x3.3-8L-D



Marking and Pin Assignment



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Outline	Package	Reel Size	Reel(pcs)	Per Carton (pcs)
CRMQTL0524AC	CRMQTL0524AC	TAPING	PDFN3.3x3.3-8L-D	13"	5000	50000

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

Symbol	Parameter		N-Channel Value	P-Channel Value	Units
V_{DS}	Drain-to-Source Voltage		44	-40	V
V_{GS}	Gate-to-Source Voltage		±20	±20	V
I_D	Continuous Drain Current	T_C = 25°C	12	-12	A
		T_C = 100°C	7.5	-7.5	
I_{DM}	Pulsed Drain Current (1)		48	-48	A
E_{AS}	Single Pulsed Avalanche Energy (2)		20	20	mJ
P_D	Power Dissipation	T_C = 25°C	15.6	14.7	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case		8	8.5	°C/W
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 150		°C

N-Channel 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	44	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 44V, V_{GS} = 0V	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.3	1.8	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(3)	V_{GS} = 10V, I_D = 4.5A	-	17.4	22.6	mΩ
		V_{GS} = 4.5V, I_D = 2A	-	20.7	26.9	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 20V, f = 1MHz	-	758	-	pF
C_{oss}	Output Capacitance		-	57	-	pF
C_{rss}	Reverse Transfer Capacitance		-	50	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 10V V_{DS} = 20V, I_D = 8A	-	11	-	nC
Q_{gs}	Gate Source Charge		-	3.1	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	2.8	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = 10V, V_{DD} = 20V I_D= 8A, R_{GEN} = 3Ω	-	4.1	-	ns
t_r	Turn-On Rise Time		-	2.9	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	14	-	ns
t_f	Turn-Off Fall Time		-	2.2	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	12	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	48	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = 6A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	I_F = 8A, di/dt = 100A/us	-	8	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	4	-	nC

P-Channel 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	-40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -40V, V_{GS} = 0V	-	-	-1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	-1.0	-1.8	-2.5	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(3)	V_{GS} = -10V, I_D = -6A	-	46	60	mΩ
		V_{GS} = -4.5V, I_D = -4A	-	58	76	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = -20V, f = 1MHz	-	785	-	pF
C_{oss}	Output Capacitance		-	57	-	pF
C_{rss}	Reverse Transfer Capacitance		-	47	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to -10V, V_{DS} = -20V, I_D = -5A	-	20	-	nC
Q_{gs}	Gate Source Charge		-	5	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	6	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = -10V, V_{DD} = -20V, I_D= -5A, R_{GEN} = 3Ω	-	10.8	-	ns
t_r	Turn-On Rise Time		-	4.5	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	13.4	-	ns
t_f	Turn-Off Fall Time		-	3.4	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-12	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-48	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = -6A	-	-	-1.2	V
trr	Body Diode Reverse Recovery Time	I_F = -5A, di/dt = 100A/us	-	43.6	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	10.4	-	nC

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

2. E_{AS} condition: Starting T_J=25C, V_{DD}=20V, V_G=10V, R_G=25ohm, L=0.5mH, I_{AS}=9A

E_{AS} condition: Starting T_J=25C, V_{DD}=-20V, V_G=-10V, R_G=25ohm, L=0.5mH, I_{AS}=-9A

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

Test Circuit

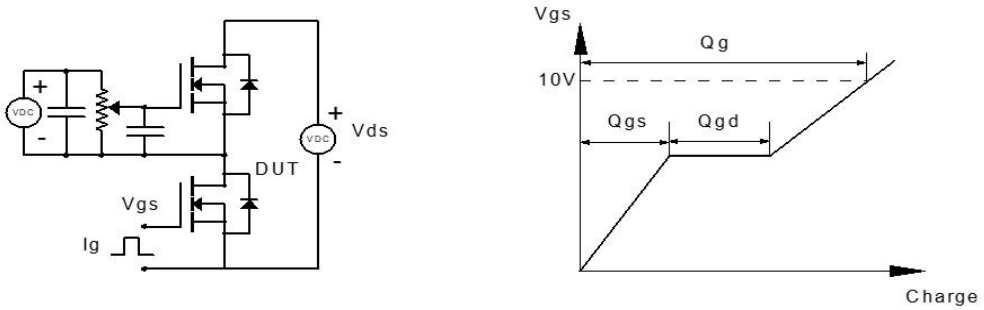


Figure 1: Gate Charge Test Circuit & Waveform

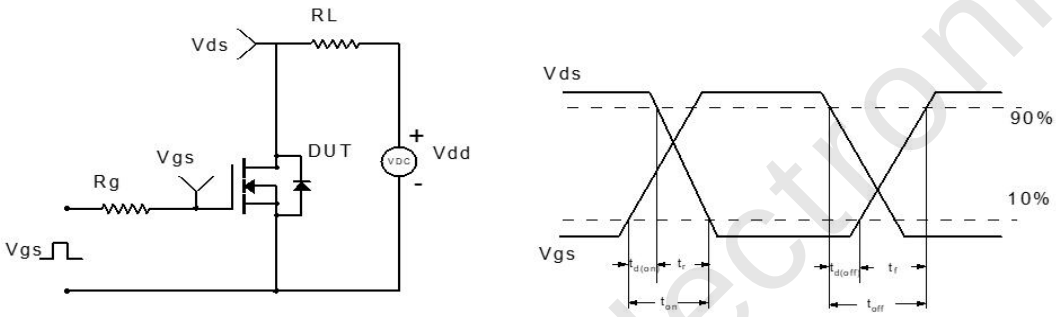


Figure 2: Resistive Switching Test Circuit & Waveform

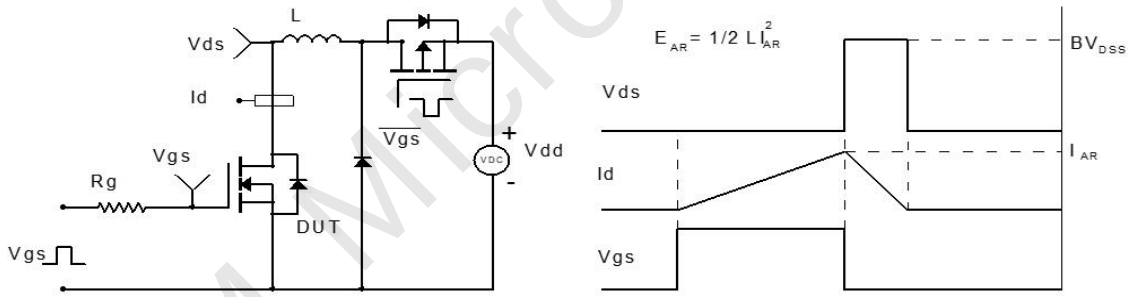


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

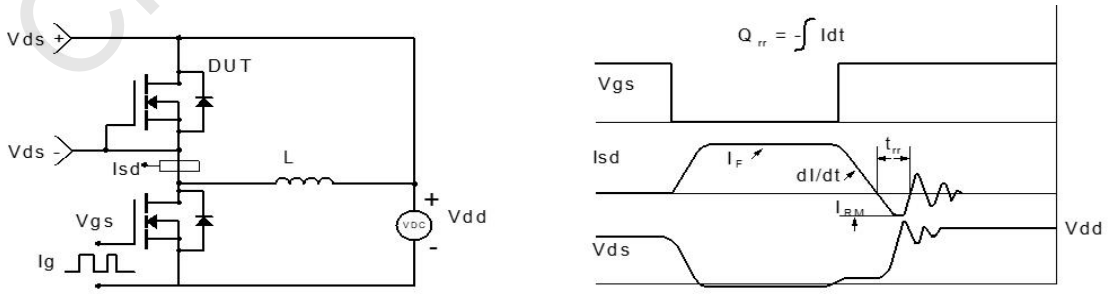
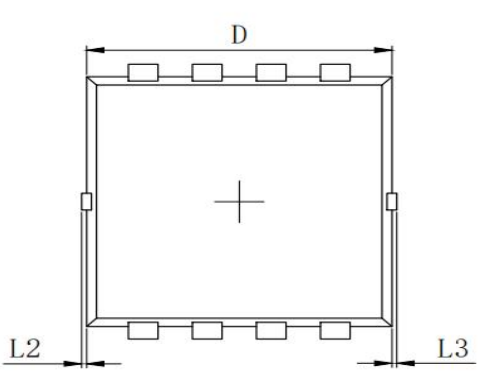
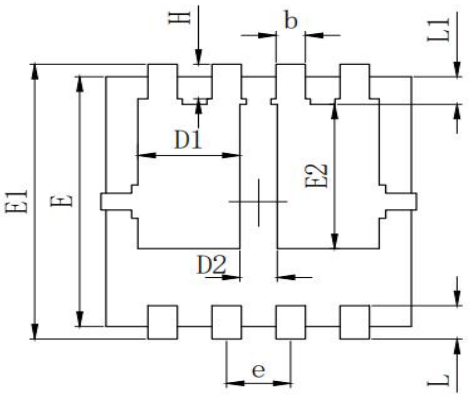
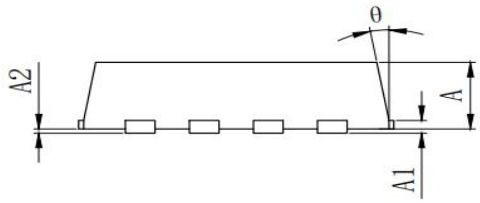


Figure 4: Diode Recovery Test Circuit & Waveform

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







SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	0.700	0.800	0.900
A1	0.152 REF.		
A2	0~0.05		
D	3.000	3.100	3.200
D1	0.935	1.035	1.135
D2	0.280	0.380	0.480
E	2.900	3.000	3.100
E1	3.150	3.300	3.450
E2	1.535	1.735	1.935
b	0.200	0.300	0.400
e	0.550	0.650	0.750
L	0.300	0.400	0.500
L1	0.180	0.330	0.480
L2	0~0.100		
L3	0~0.100		
H	0.315	0.415	0.515
θ	8°	10°	12°