

## Description

### N-channel Enhancement Mode Power MOSFET

#### Features

- 30V, 180A  
 $R_{DS(ON)}$  Typ = 2.1m $\Omega$  @  $V_{GS}$  = 10V  
 $R_{DS(ON)}$  Typ = 2.9m $\Omega$  @  $V_{GS}$  = 4.5V
- Advanced Trench Technology
- Excellent  $R_{DS(ON)}$  and Low Gate Charge

#### Applications

- Load Switch
- PWM Application
- Power Management



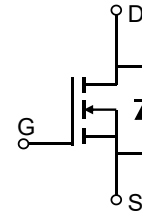
**100% UIS TESTED!**  
**100%  $\Delta V_{ds}$  TESTED!**



TO-220C-3L



Marking and Pin Assignment



Schematic Diagram

### Package Marking and Ordering Information

Device Marking	Device	Outline	Package	TUBE (pcs)	Inner Box (pcs)	Per Carton (pcs)
CRMCTL0302A	CRMCTL0302A	TUBE	TO-220C-3L	50	1000	5000

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

Symbol	Parameter	Value	Units
$V_{DS}$	Drain-to-Source Voltage	30	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C = 25^\circ\text{C}$	A
		$T_C = 100^\circ\text{C}$	
$I_{DM}$	Pulsed Drain Current <sup>(1)</sup>	720	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(2)</sup>	306	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ\text{C}$	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.84	$^\circ\text{C/W}$
$T_J, T_{STG}$	Junction & Storage Temperature Range	-55 to 150	$^\circ\text{C}$

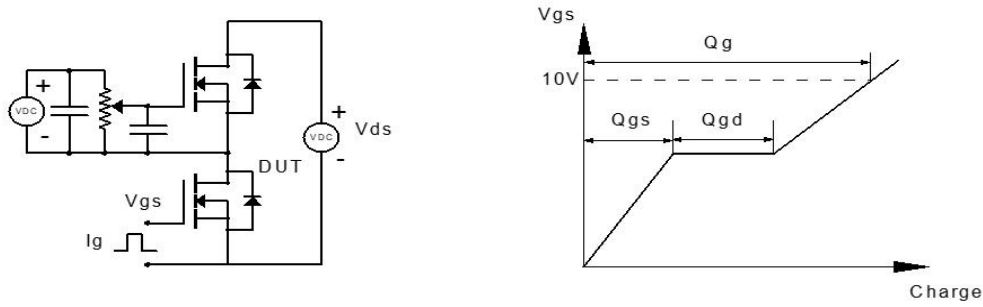


## Electrical Characteristics ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

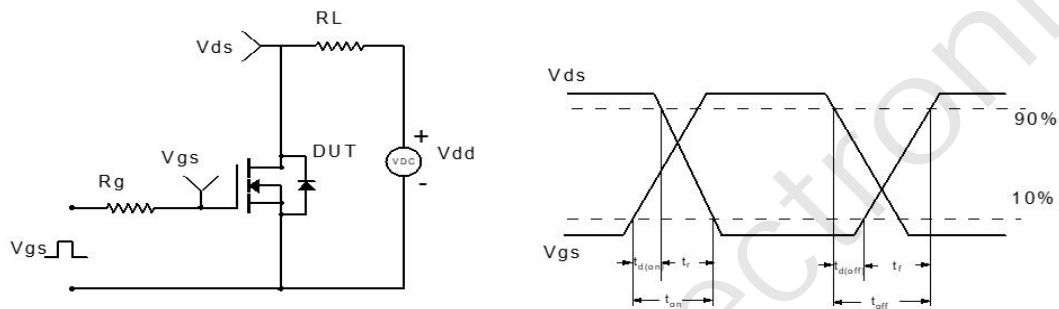
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V	30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V	-	-	1.0	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V	-	-	±100	nA
On Characteristics						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	1.0	1.6	2.5	V
R <sub>DS(ON)</sub>	Static Drain-Source ON-Resistance <sup>(3)</sup>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A	-	2.1	2.7	mΩ
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 10A	-	2.9	3.8	mΩ
Dynamic Characteristics						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 15V, f = 1MHz	-	5120	-	pF
C <sub>oss</sub>	Output Capacitance		-	600	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	445	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> = 0 to 10V V <sub>DS</sub> = 15V, I <sub>D</sub> = 30A	-	97	-	nC
Q <sub>gs</sub>	Gate Source Charge		-	20	-	nC
Q <sub>gd</sub>	Gate Drain("Miller") Charge		-	23	-	nC
Switching Characteristics						
t <sub>d(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> = 10V, V <sub>DD</sub> = 15V I <sub>D</sub> = 30A, R <sub>GEN</sub> = 3Ω	-	16	-	ns
t <sub>r</sub>	Turn-On Rise Time		-	30	-	ns
t <sub>d(off)</sub>	Turn-Off DelayTime		-	54	-	ns
t <sub>f</sub>	Turn-Off Fall Time		-	19	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	180	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	720	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 30A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	I <sub>F</sub> = 30A, di/dt = 100A/us	-	23	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	14	-	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
  2.  $E_{AS}$  condition: Starting  $T_J = 25^\circ\text{C}$ ,  $V_{DD} = 15\text{V}$ ,  $V_G = 10\text{V}$ ,  $R_G = 25\text{ohm}$ ,  $L = 0.5\text{mH}$ ,  $I_{AS} = 35\text{A}$
  3. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 0.5\%$ .

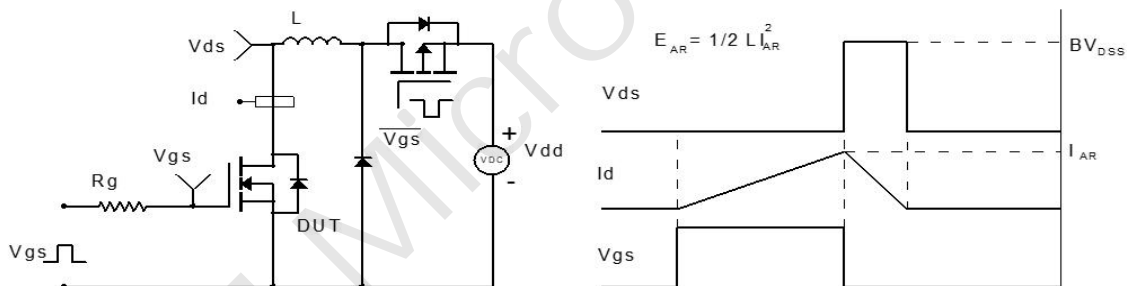
## Test Circuit



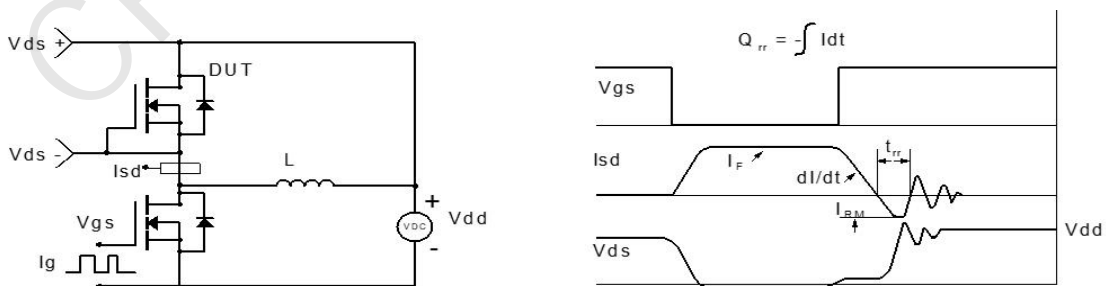
**Figure 1: Gate Charge Test Circuit & Waveform**



**Figure 2: Resistive Switching Test Circuit & Waveform**

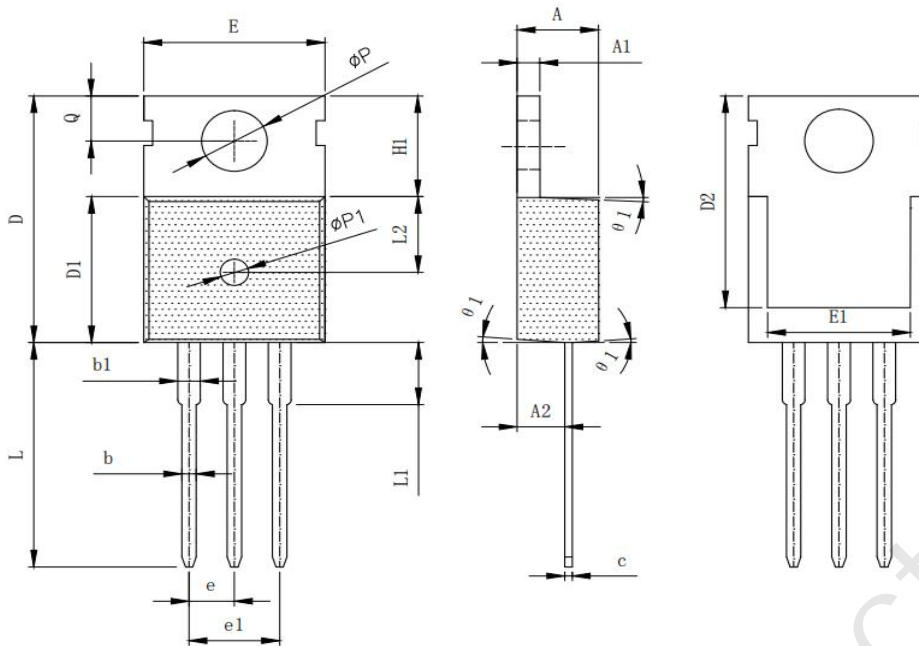


**Figure 3: Unclamped Inductive Switching Test Circuit & Waveform**



**Figure 4: Diode Recovery Test Circuit & Waveform**

## Package Mechanical Data(TO-220C-3L)



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.25	1.30	1.35
A2	2.30	2.40	2.50
b	0.70	0.80	0.90
b1	1.25	1.35	1.45
c	0.40	0.50	0.60
D	15.50	15.80	16.10
D1	9.10	9.20	9.30
D2	12.73	12.83	12.93
E	9.70	9.90	10.20
E1	7.60	8.00	8.40
e	2.54 (BSC)		
e1	5.08 (BSC)		
H1	6.30	6.50	6.80
L	12.75	13.08	13.50
L1	--	--	3.10
L2	4.30	4.60	4.90
φP	3.50	3.60	3.70
φP1	1.40	1.50	1.60
q	2.70	--	2.90
θ 1	2°	4°	6°

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