华润微电子(重庆)有限公司

CRSQ023N10N4

SkyMOS4 N-MOSFET 100V, 2.2mΩ, 180A

Features

- Uses CRM(CQ) advanced SkyMOS4 technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent Q_gx$R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria

Applications

- Motor control and drive
- Battery management
- UPS (Uninterrupible Power Supplies)

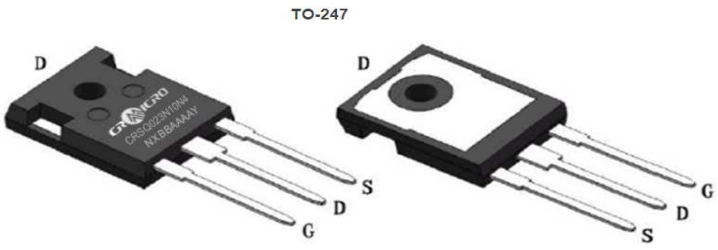
Product Summary

V_{DS}	100V
$R_{DS(on)}$	2.2mΩ
I_D	180A

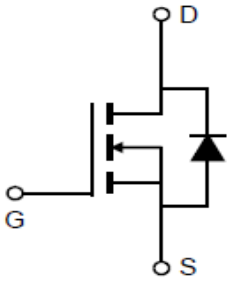
100% DVDS Tested

100% Avalanche Tested

RoHS HF



CRSQ023N10N4



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSQ023N10N4	CRSQ023N10N4	TO-247	Tube	N/A	N/A	30pcs

Absolute Maximum Ratings

Parameter	**Symbol**	**Value**	**Unit**
Drain-source voltage	V_{DS}	100	V
Continuous drain current T_C = 25°C (Silicon limit) T_C = 25°C (Package limit) T_C = 100°C (Silicon limit)	I_D	 261 180 165	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	720	A
Avalanche energy, single pulse (ID = 45A, Rg=25Ω)	E_{AS}	500	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	300	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)	Tsold	260	°C

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Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case.	R_{thJC}	-	0.32	0.42	°C/W	
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	-	-	55	°C/W	

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV_{DSS}	100	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	2.2	3	3.8	V	V_{DS}=V_{GS},I_D=250uA
Zero gate voltage drain current	I_{DSS}	- -	- -	1 100	μA	V_{DS}=100V,V_{GS}=0V T_j=25°C T_j=125°C
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	2.2	2.64	mΩ	V_{GS}=10V, I_D=90A VGS=10V, ID=90A
Transconductance	g_{fs}	-	265	-	S	V_{DS}=5V,I_D=90A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	11435	-	pF	V_{GS}=0V, V_{DS}=50V, f=1MHz
Output Capacitance	C_{oss}	-	1627	-		
Reverse Transfer Capacitance	C_{rss}	-	37	-		
Gate Total Charge	Q_G	-	165	-	nC	V_{GS}=10V, V_{DS}=50V, I_D=90A, f=1MHz
Gate-Source charge	Q_{gs}	-	65.5	-		
Gate-Drain charge	Q_{gd}	-	21.7	-		
Turn-on delay time	$t_{d(on)}$	-	28.7	-	ns	V_{GS}=10V, V_{DD}=50V, R_{G_ext}=3.0Ω
Rise time	t_r	-	113.5	-		
Turn-off delay time	$t_{d(off)}$	-	86	-		
Fall time	t_f	-	108.5	-		
Gate resistance	R_G	-	1.63	-	Ω	V_{GS}=0V, V_{DS}=0V, f=1MHz

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Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	0.9	1.4	V	V_{GS}=0V,I_{SD}=90A
Body Diode Continuous Forward Current	I_S	-	-	180	A	T_C = 25°C
Body Diode Pulsed Current	$I_{S\ pulse}$	-	-	720	A	T_C = 25°C
Body Diode Reverse Recovery Time	t_{rr}	-	98.6	-	ns	I_F=90A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	217.8	-	nC	

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Typical Performance Characteristics

Fig 1: Output Characteristics

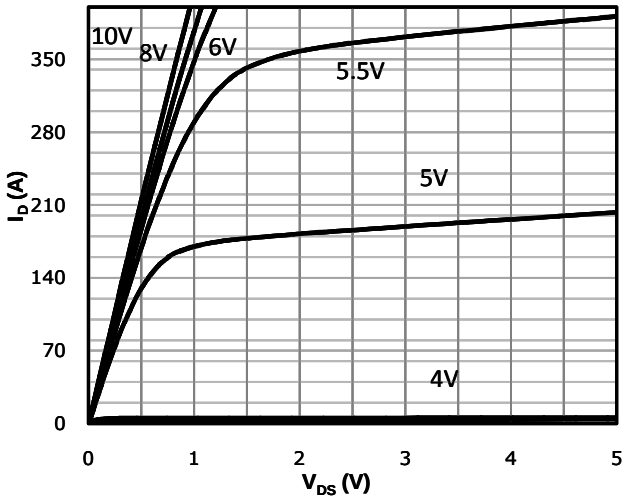
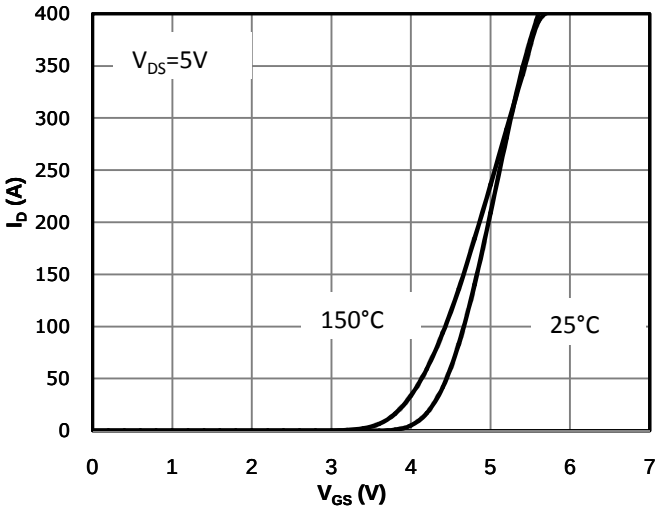


Fig 2: Transfer Characteristics



3: Rds(on) vs Drain Current and Gate Voltage

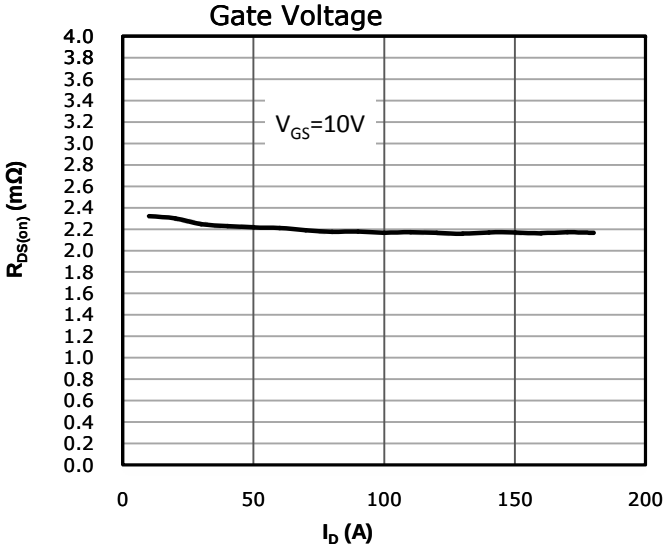


Fig 4: Rds(on) vs Gate Voltage

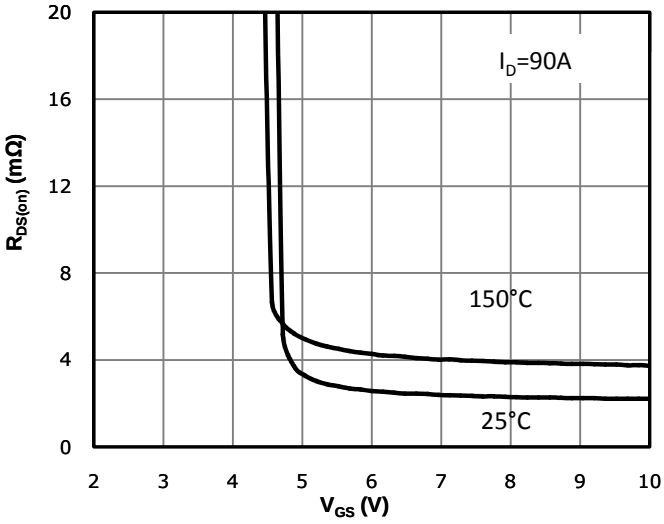


Fig 5: Rds(on) vs. Temperature

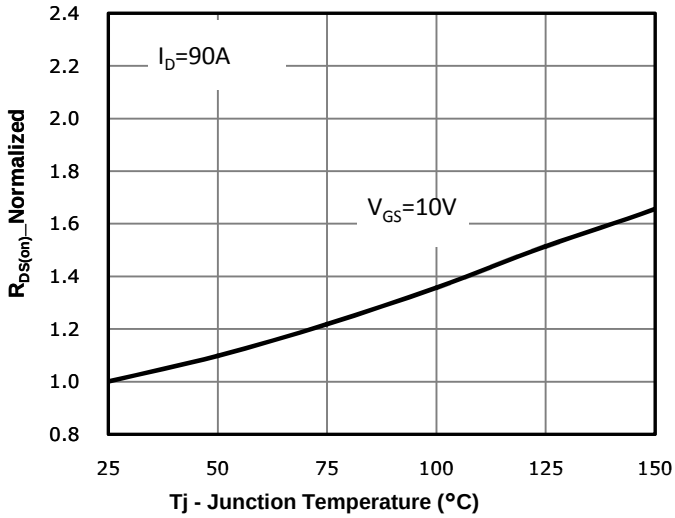
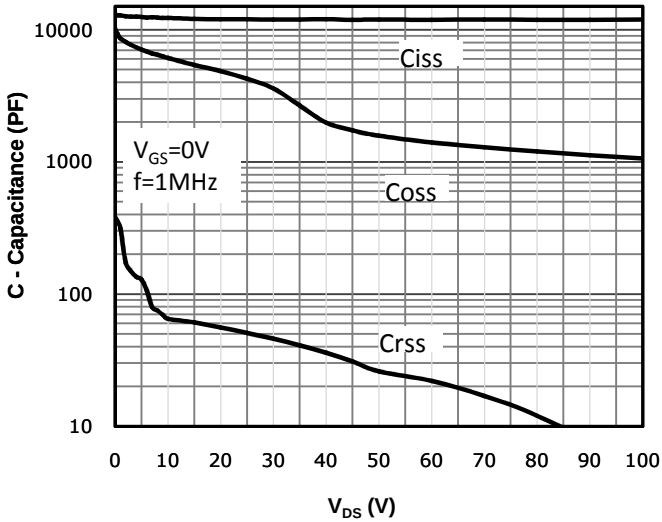


Fig 6: Capacitance Characteristics



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Fig 7: Gate Charge Characteristics

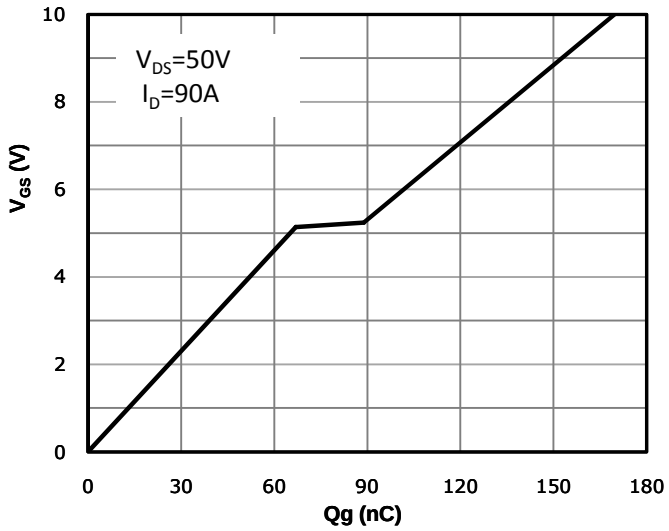


Fig 8: Body-diode Forward Characteristics

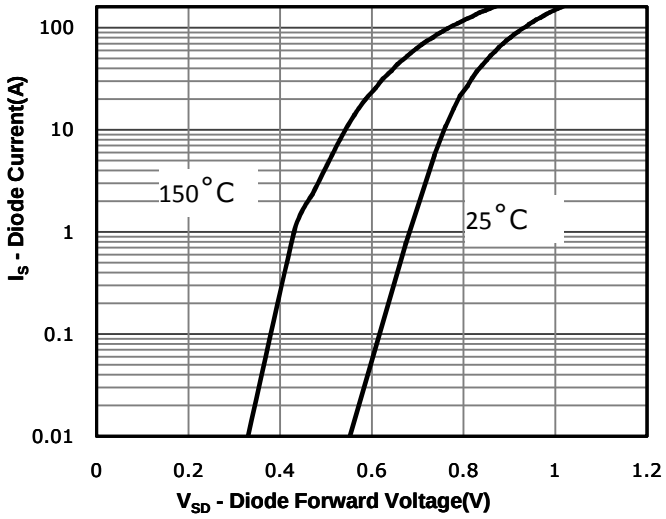


Fig 9: Power Dissipation

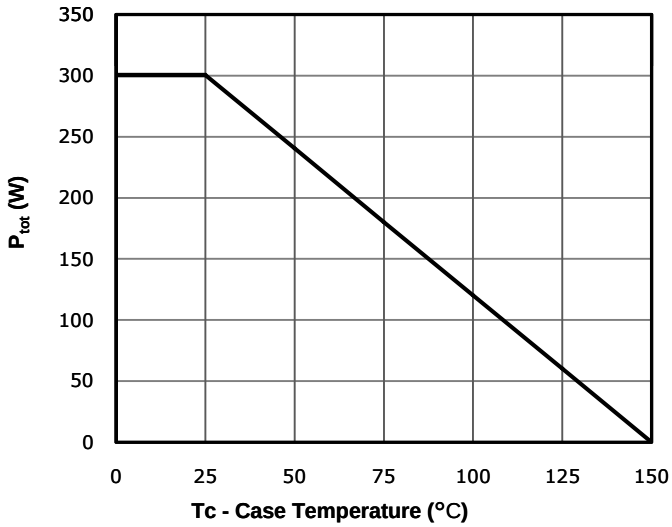


Fig 10: Drain Current Derating

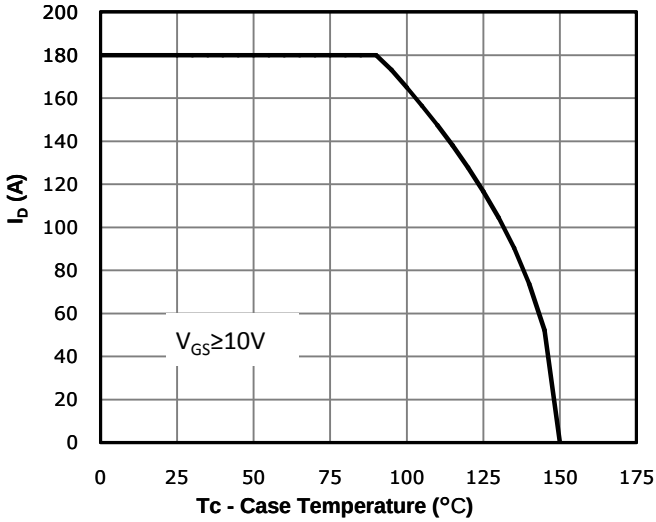
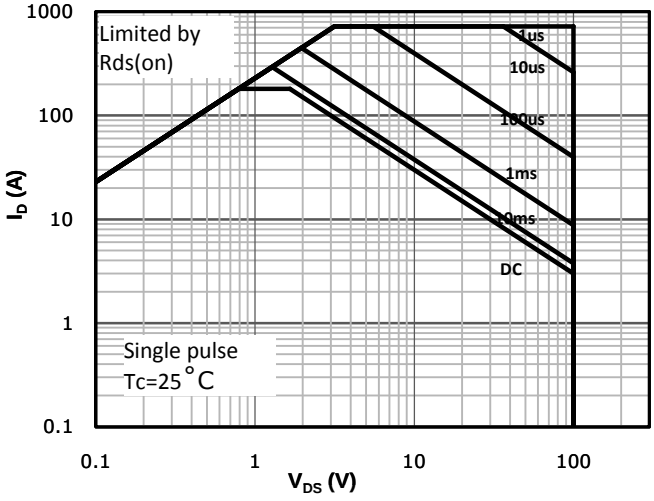
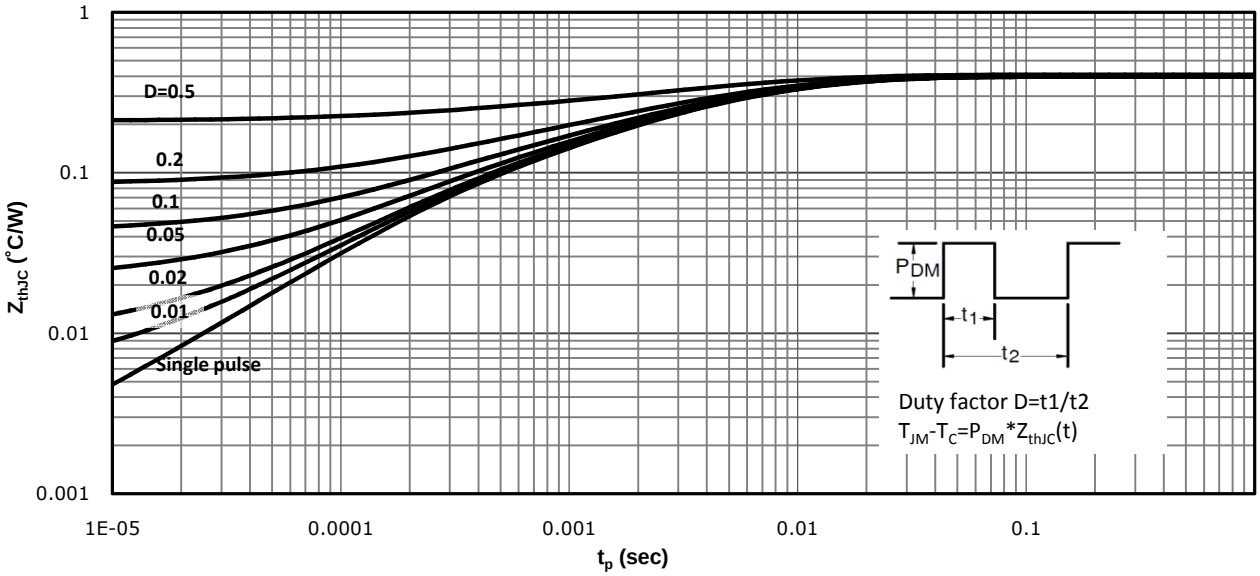


Fig 11: Safe Operating Area



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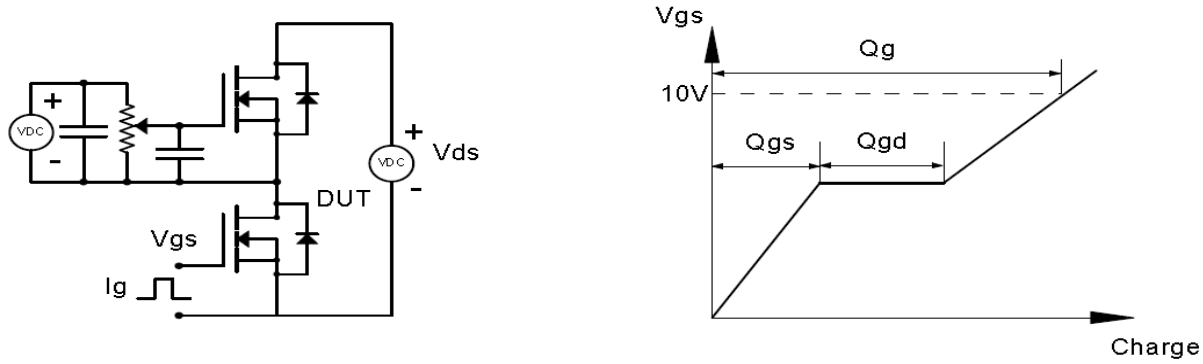
Fig 12: Max. Transient Thermal Impedance



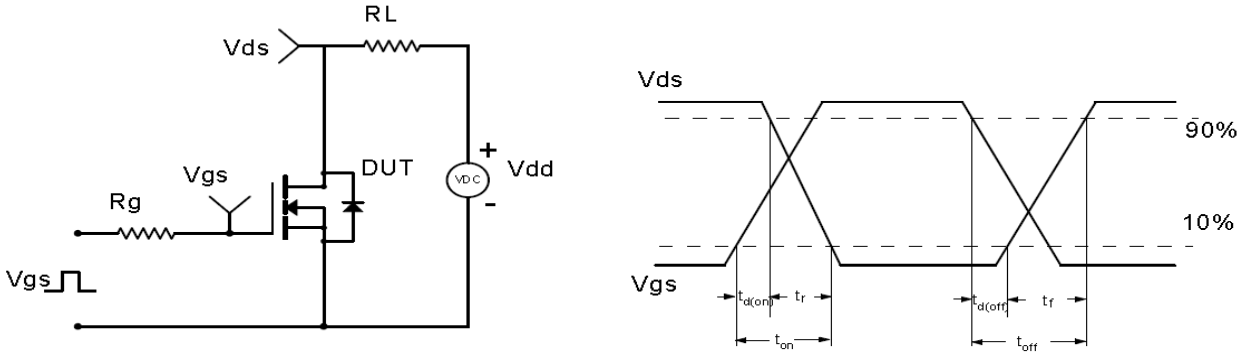
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Test Circuit & Waveform

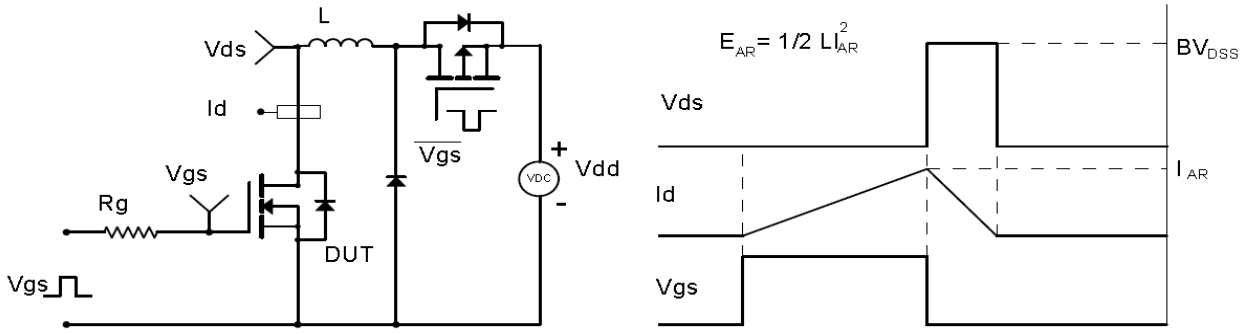
Gate Charge Test Circuit & Waveform



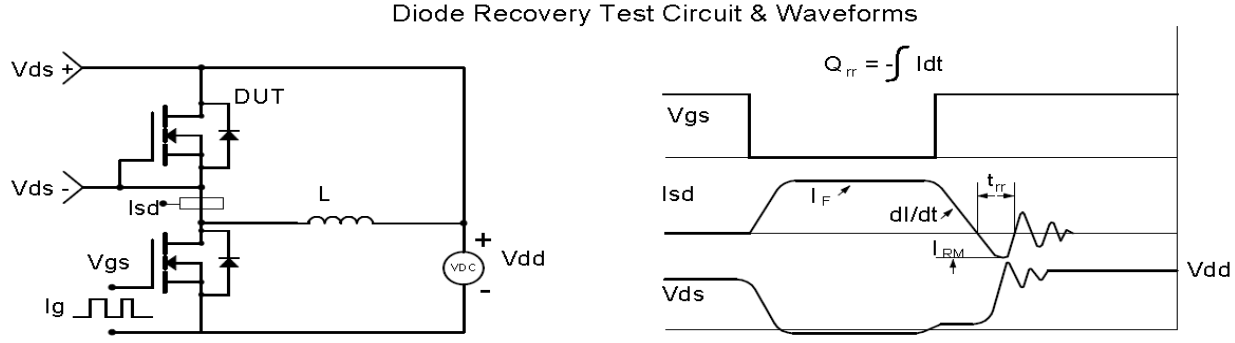
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

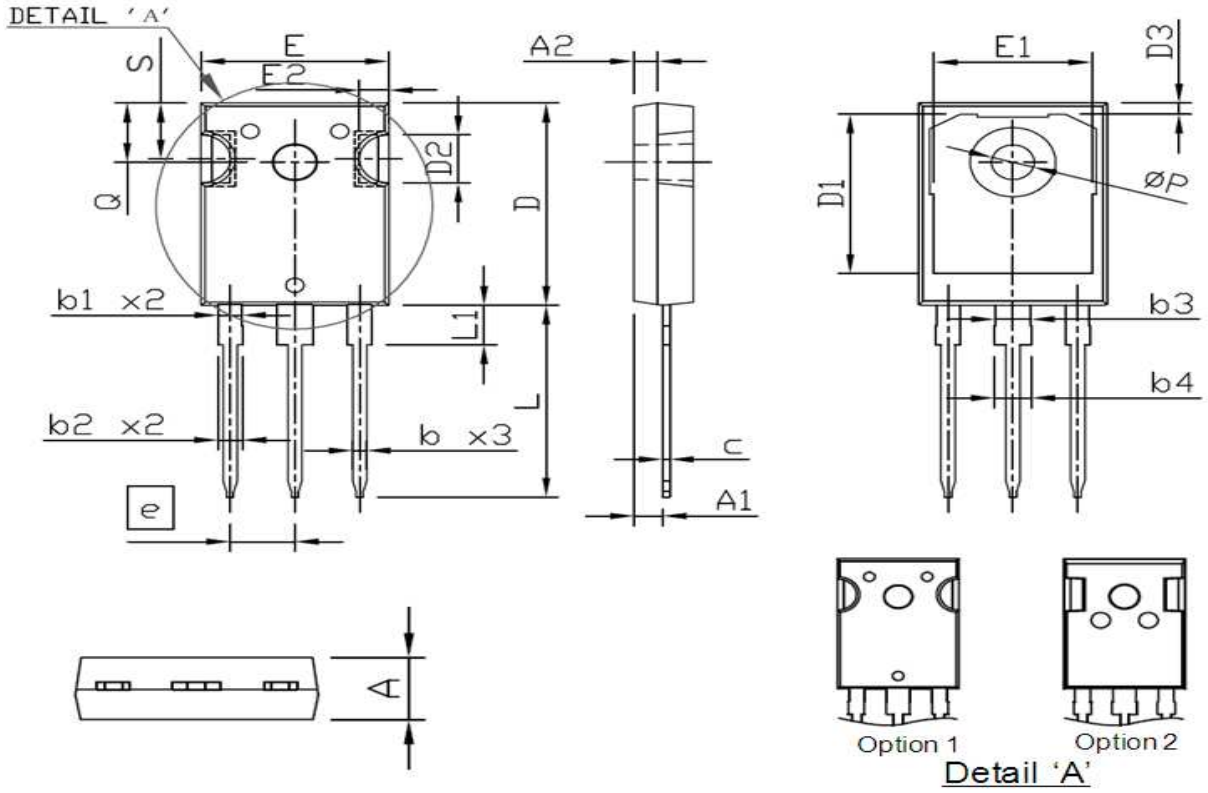


Diode Recovery Test Circuit & Waveforms



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Package Outline: TO-247



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.85	5.15	0.191	0.203
A1	2.27	2.54	0.089	0.100
A2	1.90	2.10	0.075	0.083
b	1.07	1.33	0.042	0.052
b1	1.90	2.16	0.075	0.085
b2	2.00	2.21	0.079	0.087
b3	2.87	3.13	0.113	0.123
b4	2.87	3.20	0.113	0.126
c	0.55	0.68	0.022	0.027
D	20.80	21.10	0.819	0.831
D1	16.25	17.65	0.640	0.695
D2	3.68	5.10	0.145	0.201
D3	0.95	1.35	0.037	0.053
e	5.44 BSC.		0.214 BSC.	
E	15.70	16.13	0.618	0.635
E1	13.03	14.15	0.513	0.557
E2	2.20	2.60	0.087	0.102
L	19.72	20.32	0.776	0.800

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L1	4.00	4.47	0.157	0.176
Q	6.04	6.30	0.238	0.248
P	3.50	3.70	0.138	0.146
S	5.49	6.00	0.216	0.236

Marking



NOTE:
NXBBAAAAY
N —Wire Bond code
X —Assembly location code
BB —Fab code
AAAA —Lot code
Y —Bin code

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Revision History

Revison	Date	Major changes
1.1	2023-04-24	Change RthJC max value

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qulified as a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability, such as automotive, aviation/aerospace and life-support devices or systems.

Any and all semicondutor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.

CRM(CQ) reserves the right to improve product design, function and reliability without notice.

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