华润微电子(重庆)有限公司

CRSQP023N10N4Z

SkyMOS4 N-MOSFET 100V, 2.3mΩ, 250A

Features

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

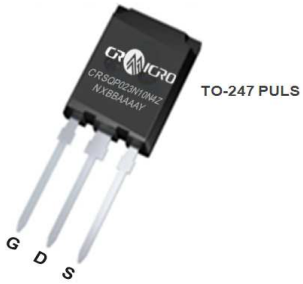
Product Summary

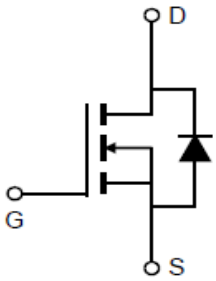
V_{DS}	100V
$R_{DS(on).typ}$	2.3mΩ
I_D	250A

100% DVDS Tested
100% Avalanche Tested

Applications

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





Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSQP023N10N4Z	CRSQP023N10N4Z	TO-247 plus	Tube	N/A	N/A	25/30pcs

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	 260 250 165	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	1000	A
Avalanche energy, single pulse (I_D = 44A, Rg=25Ω)[1]	E_{AS}	500	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	298	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

※. Notes:
1.EAS is tested at starting Tj = 25℃, L = 0.5mH, IAS =44.6A, VGS = 10V.
2.Repetitive rating, pulse width limited by junction temperature TJ(MAX)=150°C. Ratings are based on low frequency and duty cycles to keep initial TJ =25°C.

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Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	0.42	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	55	

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	$V_{GS(th)}$	2.0	3.0	4.0	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}	0	-	±100	nA	V_{GS}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	2.3	2.8	mΩ	VGS=10V, ID=90A TO-220
Transconductance	g_{fs}	-	265.0	530	S	V_{DS}=5V, I_D=90A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	11435	17152.5	pF	V_{GS}=0V, V_{DS}=50V, f=1MHz
Output Capacitance	C_{oss}	-	1627	2440.5		
Reverse Transfer Capacitance	C_{rss}	-	37	74		
Gate Total Charge	Q_G	-	165.0	247.5	nC	V_{GS}=10V, V_{DS}=50V, I_D=90A
Gate-Source charge	Q_{gs}	-	65.5	98.25		
Gate-Drain charge	Q_{gd}	-	21.7	43.4		
Turn-on delay time	$t_{d(on)}$	-	28.7	57.4	ns	V_{GS}=10V, V_{DD}=50V, R_{G_ext}=2.7Ω
Rise time	t_r	-	113.5	170.3		
Turn-off delay time	$t_{d(off)}$	-	86.0	129		
Fall time	t_f	-	108.5	162.8		
Gate resistance	R_G	-	1.6	8.2	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 Reverse Recovery Time	t_{rr}	-	98.6	197	ns	I_F=90A,dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	217.8	436	nC	

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Typical Performance Characteristics

Fig 1: Output Characteristics

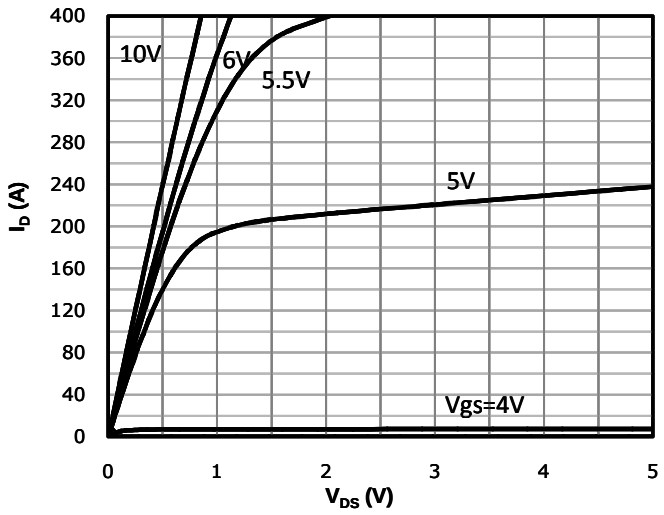


Fig 2: Transfer Characteristics

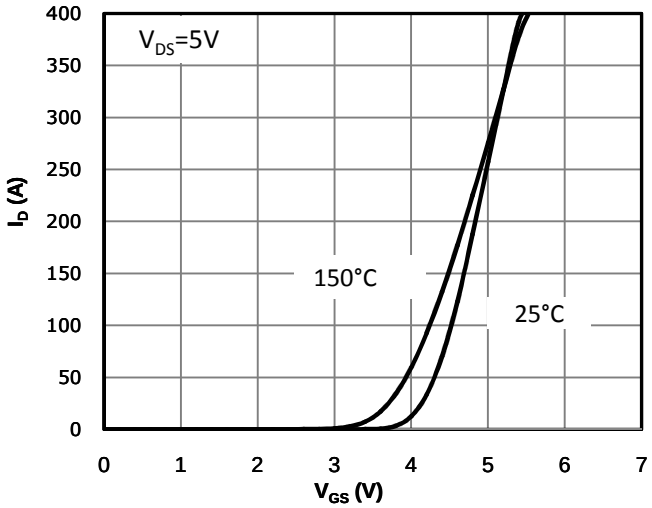


Fig 3: Rds(on) vs Drain Current and Gate Voltage

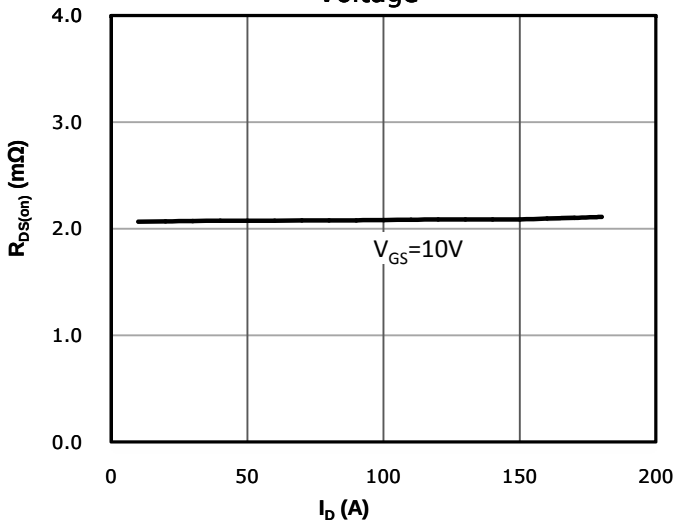


Fig 4: Rds(on) vs Gate Voltage

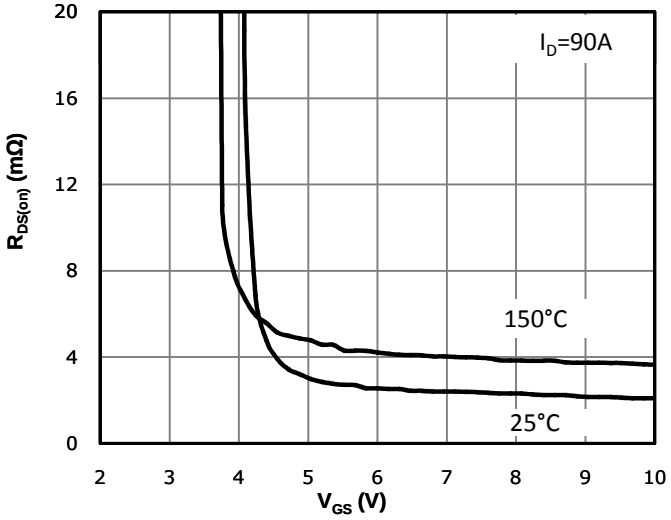


Fig 5: Rds(on) vs. Temperature

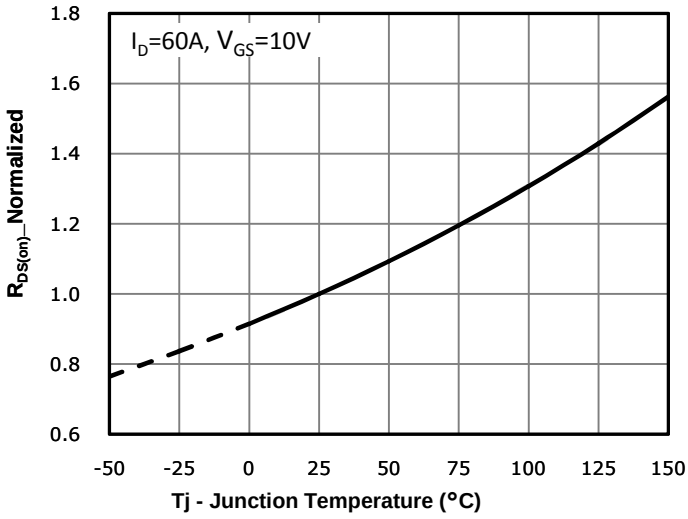
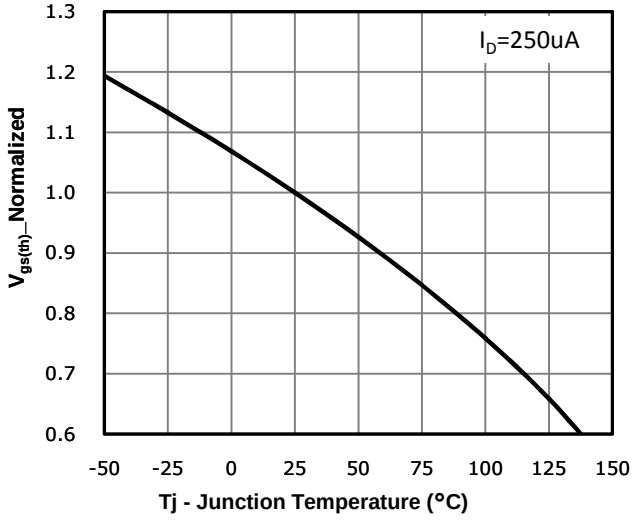


Fig 6: Vgs(th) vs. Temperature



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Fig 7: BVdss vs. Temperature

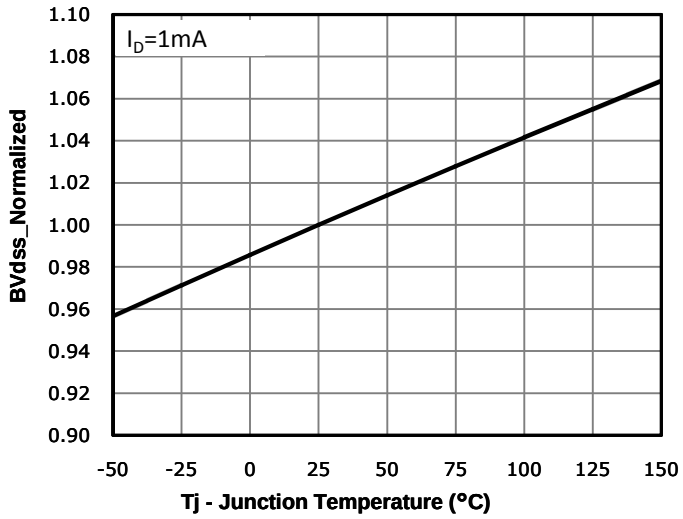


Fig 8: Capacitance Characteristics

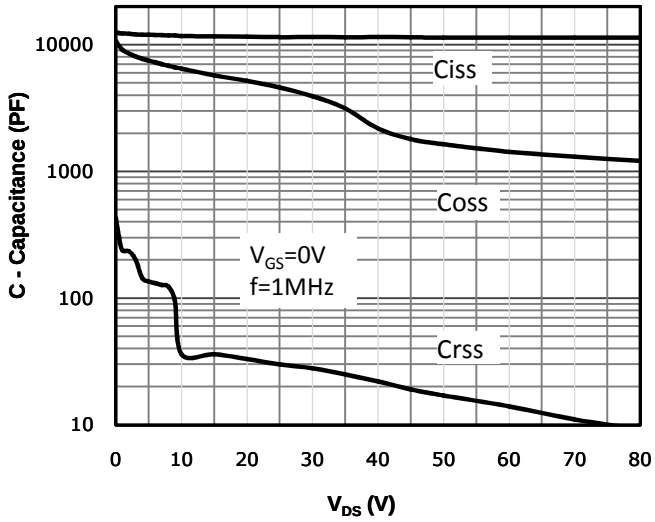


Fig 9: Gate Charge Characteristics

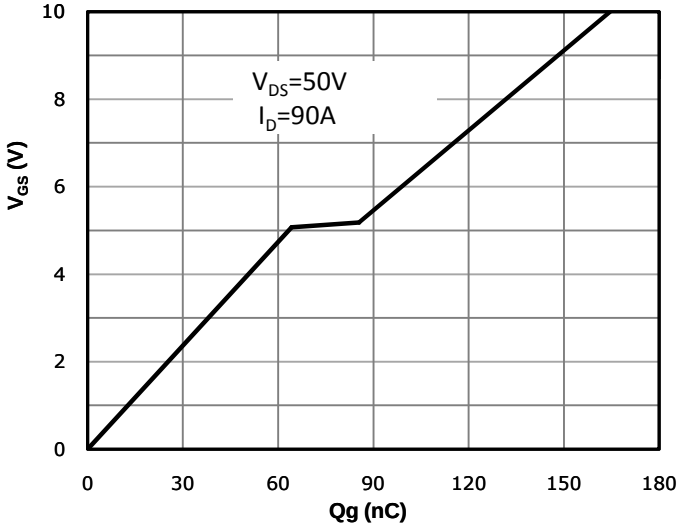


Fig 10: Body-diode Forward Characteristics

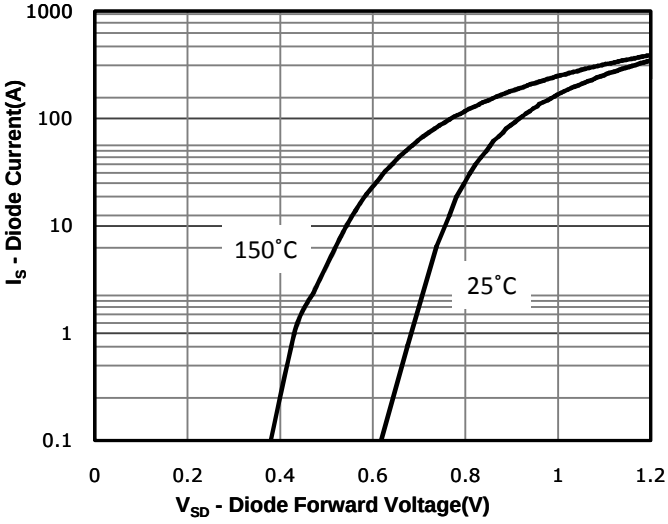


Fig 11: Power Dissipation

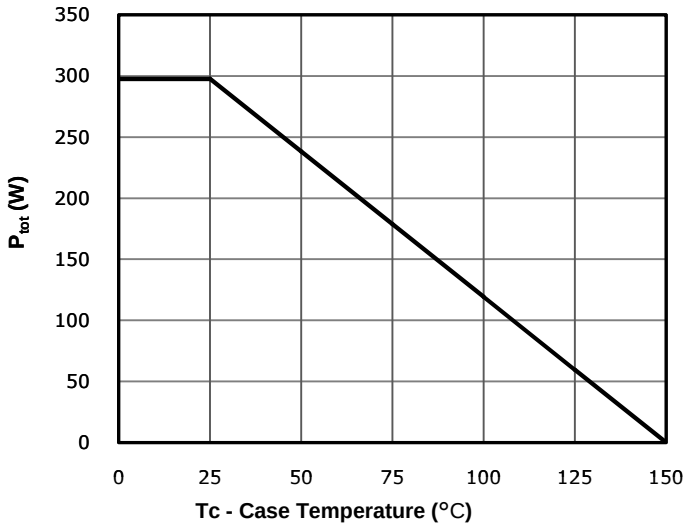
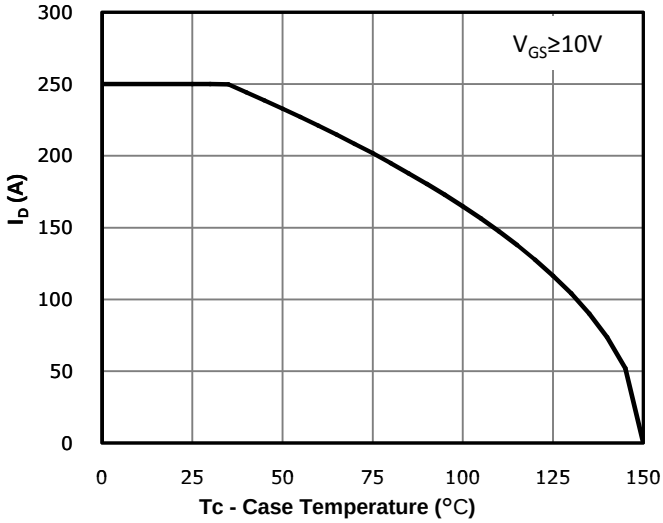


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

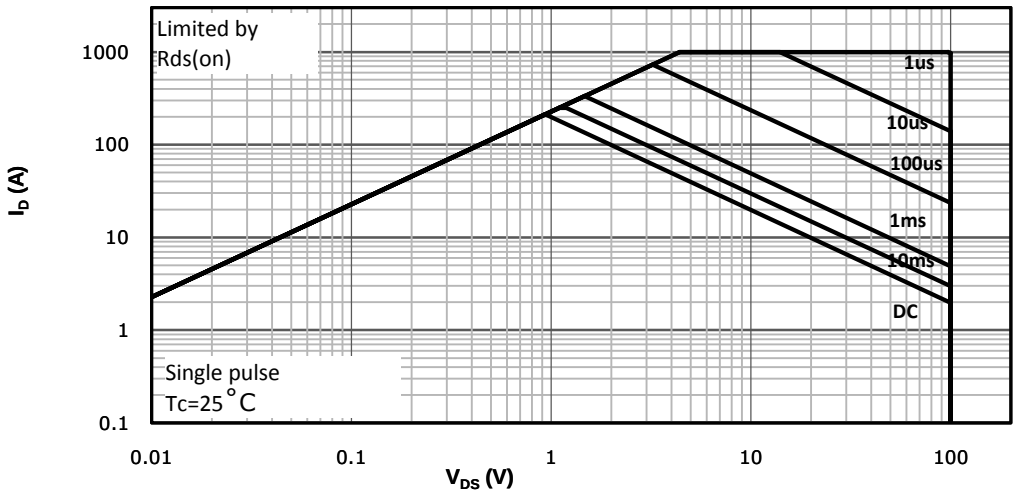
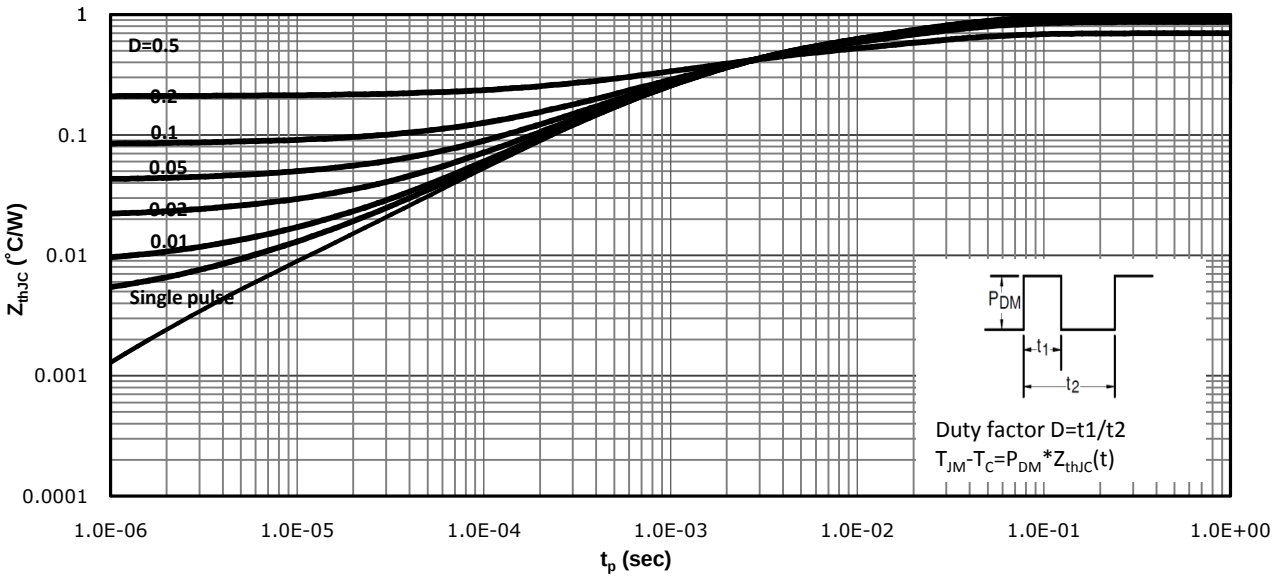


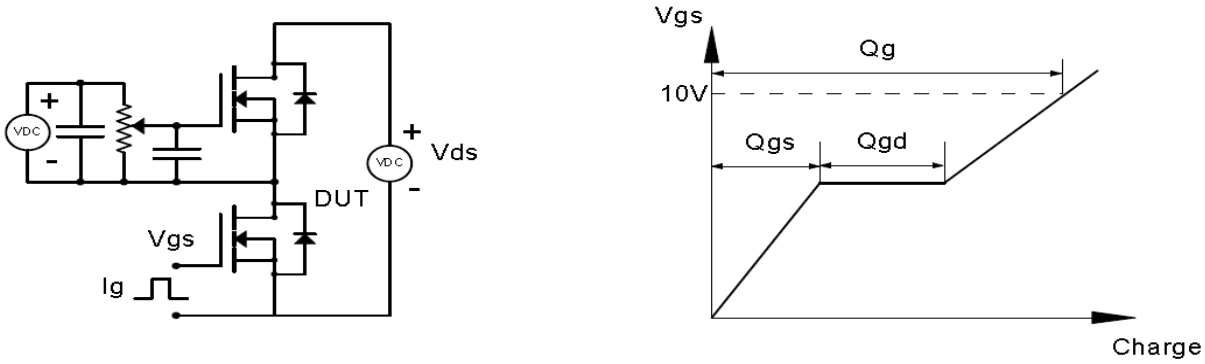
Fig 14: Max. Transient Thermal Impedance



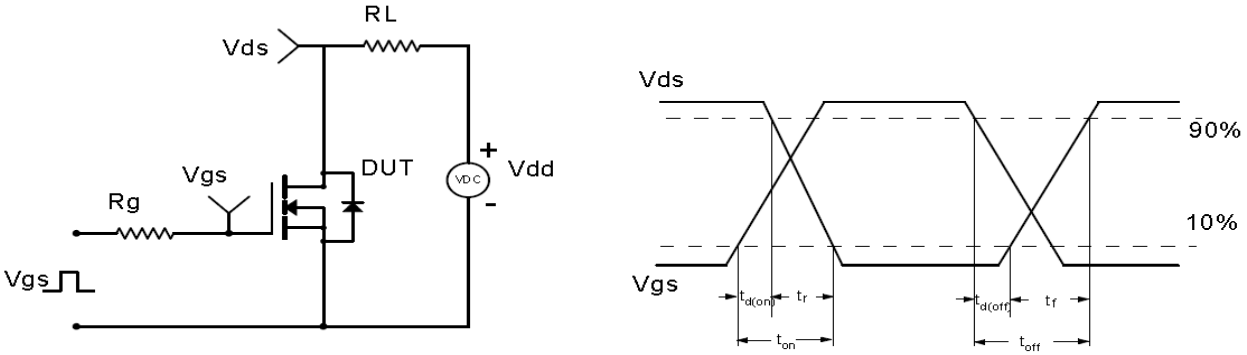
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Test Circuit & Waveform

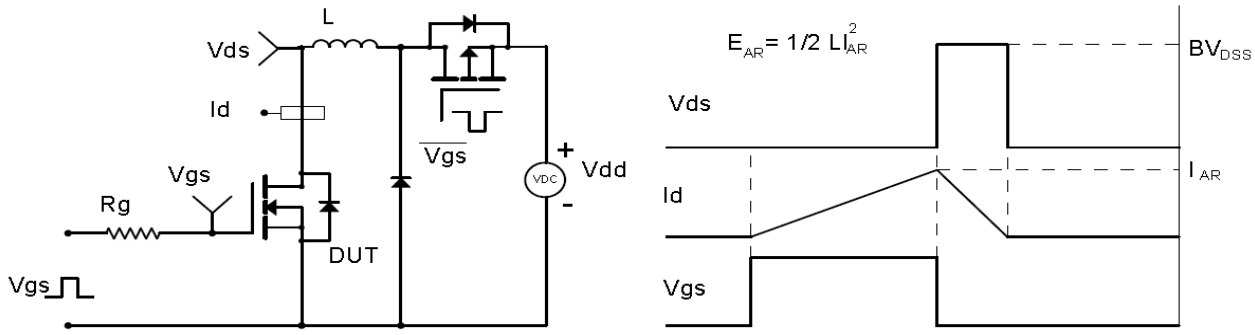
Gate Charge Test Circuit & Waveform



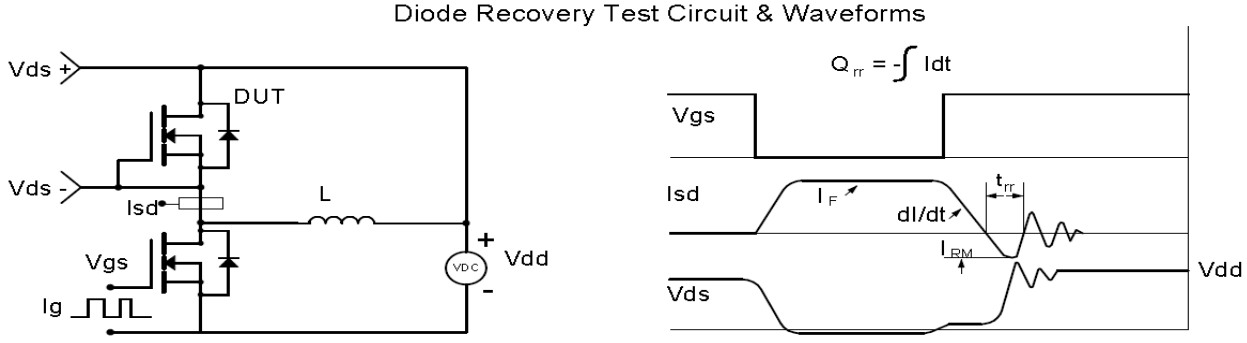
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

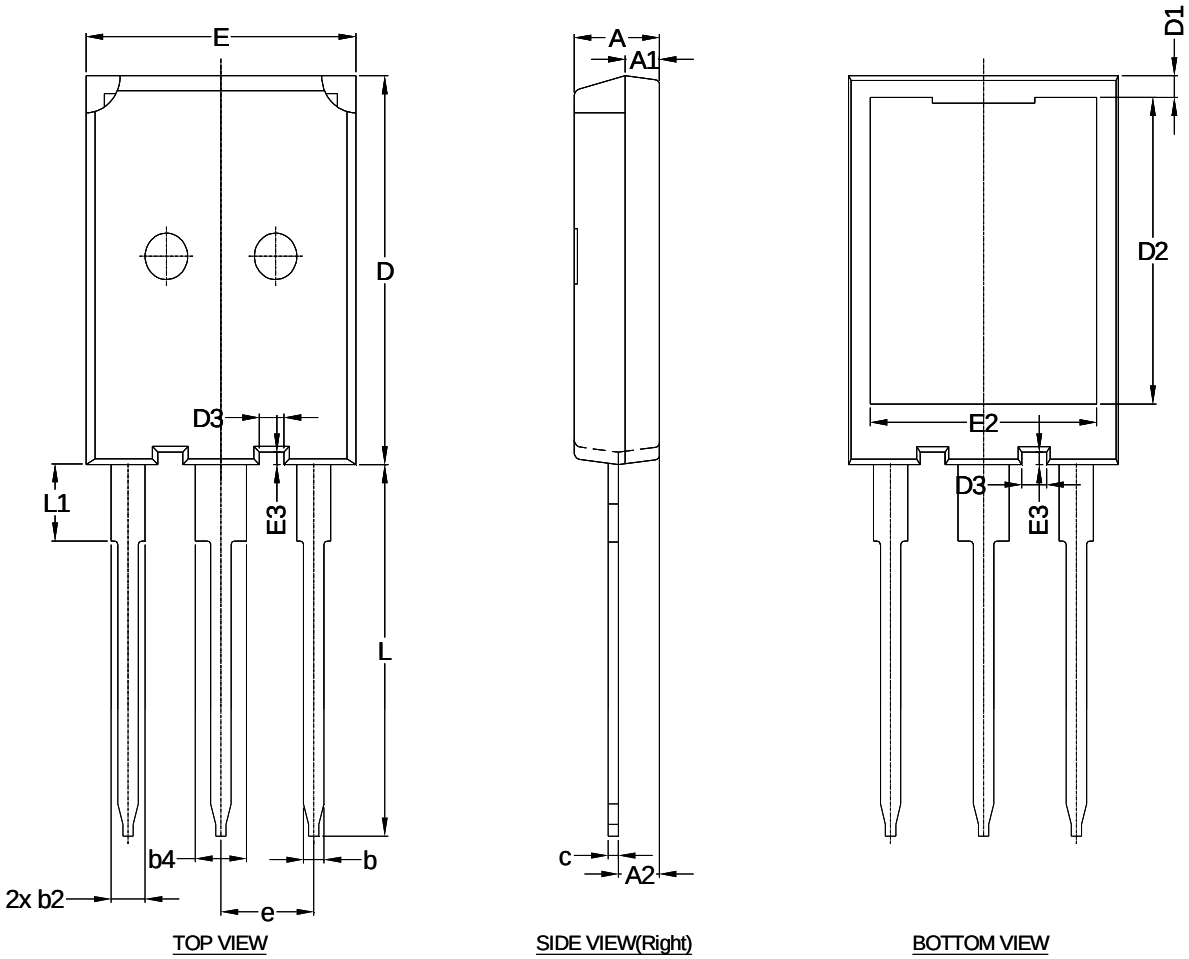


Diode Recovery Test Circuit & Waveforms



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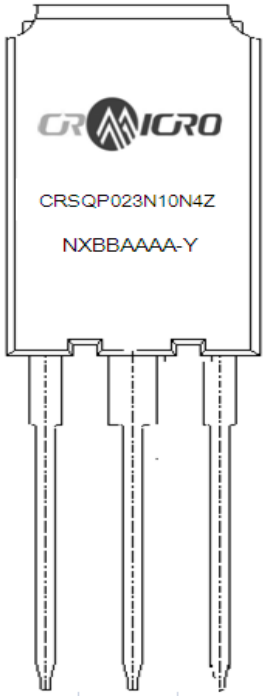
Package Outline: TO-247 plus



Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	4.90	5.00	5.10
A1	1.90	2.00	2.14
A2	2.20	2.40	2.60
b	1.07	1.200	1.33
b2	1.90	2.04	2.41
b4	2.87	3.04	3.38
c	0.50	0.60	0.70
D	20.80	21.00	21.20
D1	0.97	1.17	1.47
D2	16.25	16.55	16.85
D3	1.30	1.45	1.60
E	15.60	15.80	16.00
E2	13.050	13.250	13.500
E3	0.53	0.68	0.83
e	5.436 BSC		
L	19.70	20.00	20.30
L1	-	4.12	4.44

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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

Revision	Date	Major changes
1.0	2023-10-07	Release of Preliminary version.

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qualified 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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