华润微电子(重庆)有限公司

CRSS109N20NZ

SkyMOS3 N-MOSFET 200V, 8.5mΩ, 100A

Features

- Uses CRM(CQ) advanced SkyMOS3 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

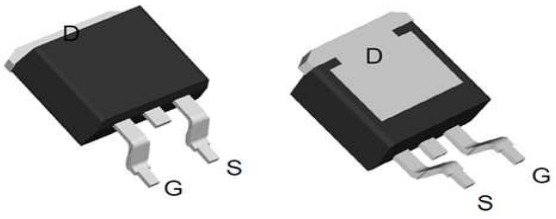
V_{DS}	200V
$R_{DS(on)}$	8.5mΩ
I_D	100A

100% DVDS Tested

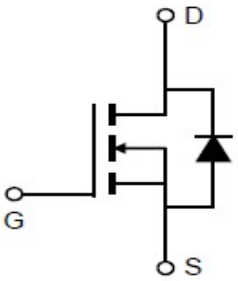
100% Avalanche Tested

RoHS HF

TO-263



CRSS109N20NZ



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSS109N20NZ	CRSS109N20NZ	TO-263	Reel	N/A	N/A	1000pcs

Absolute Maximum Ratings

Parameter	**Symbol**	**Value**	**Unit**
Drain-source voltage	V_{DS}	200	V
Continuous drain current T_C = 25°C (Silicon limit) T_C = 25°C (Package limit) T_C = 100°C (Silicon limit)	I_D	 100 160 65	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	400	A
Avalanche energy, single pulse (I_{AS} = 35A, Rg=25Ω)	E_{AS}	306	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	250	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}	-	0.30	0.50	°C/W	
Thermal resistance, junction – ambient(min.	R_{thJA}	-	-	62	°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}	200	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	2	3	4	V	V_{DS}=V_{GS},I_D=250uA
Zero gate voltage drain current	I_{DSS}	0 0	- -	1 100	μA	V_{DS}=200V,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	$R_{DS(on)}$	-	8.5	10.3	mΩ	V_{GS}=10V, I_D=50A Tj=25°C
Transconductance	g_{fs}	40	93	180	S	V_{DS}=5V,I_D=50A
Dynamic Characteristic						
Input Capacitance	C_{iss}	3213	4819	7229	pF	V_{GS}=0V, V_{DS}=100V, f=1MHz
Output Capacitance	C_{oss}	270	405	608		
Reverse Transfer Capacitance	C_{rss}	15	23	34.5		
Gate Total Charge	Q_G	46	69	104	nC	V_{GS}=10V, V_{DS}=100V, I_D=50A, f=1MHz
Gate-Source charge	Q_{gs}	17	25	38		
Gate-Drain charge	Q_{gd}	11	16	24		

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Turn-on delay time	$t_{d(on)}$	11	16	24	ns	V_{DS}=100V I_D=50A R_G=2.7Ω V_{GS}=10V;
Rise time	t_r	55	82	123		
Turn-off delay time	$t_{d(off)}$	37	55	83		
Fall time	t_f	56	84	126		
Gate resistance	R_G	2.0	4.2	6.0	Ω	V_{GS}=0V, V_{DS}=0V, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	0.5	0.85	1.4	V	V_{GS}=0V,I_{SD}=50A
Body Diode Continuous Forward Current	I_S	-	-	100	A	T_C = 25°C
Body Diode Pulsed Current	$I_{S\ pulse}$	-	-	400	A	T_C = 25°C
Body Diode Reverse Recovery Time	t_{rr}	65	129	258	ns	I_{SD}=50A, V_{GS}=0V, dIF/dt=100A/us;
Body Diode Reverse Recovery Charge	Q_{rr}	376	752	1504	nC	

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Typical Performance Characteristics

Fig 1: Output Characteristics

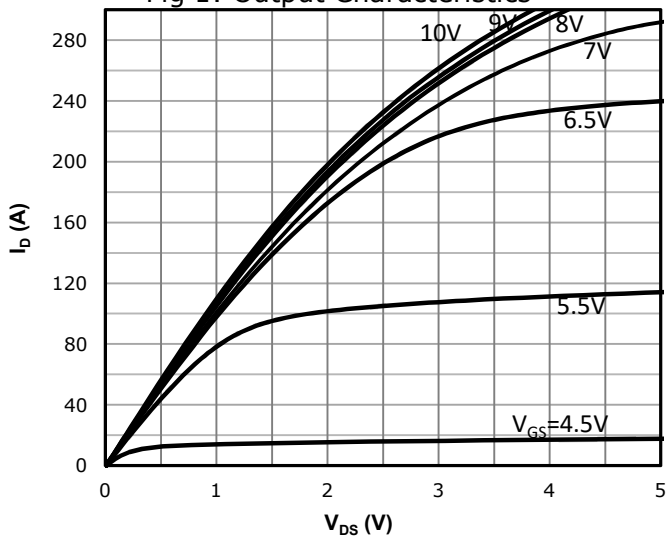


Fig 2: Transfer Characteristics

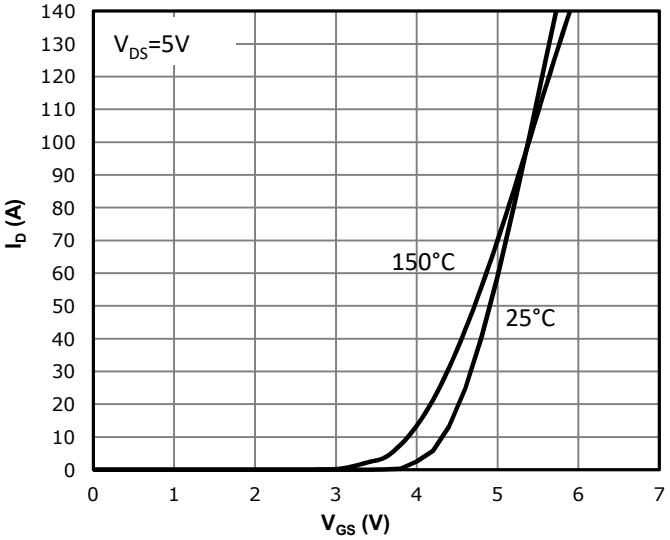


Fig 3: Rds(on) vs Drain Current and Gate Voltage

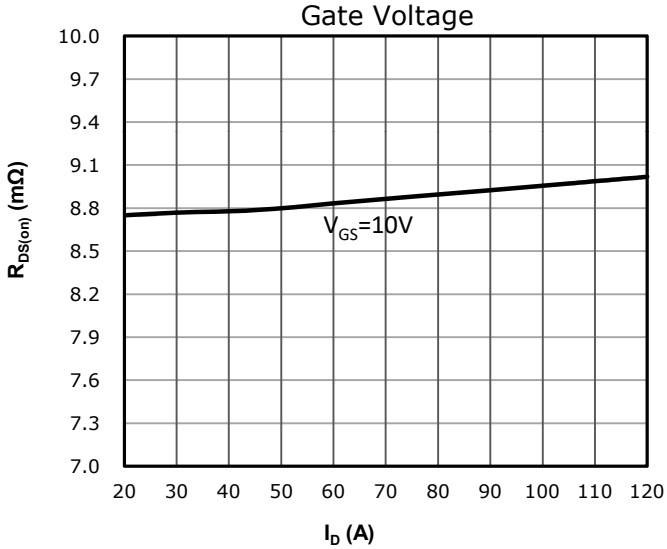


Fig 4: Rds(on) vs Gate Voltage

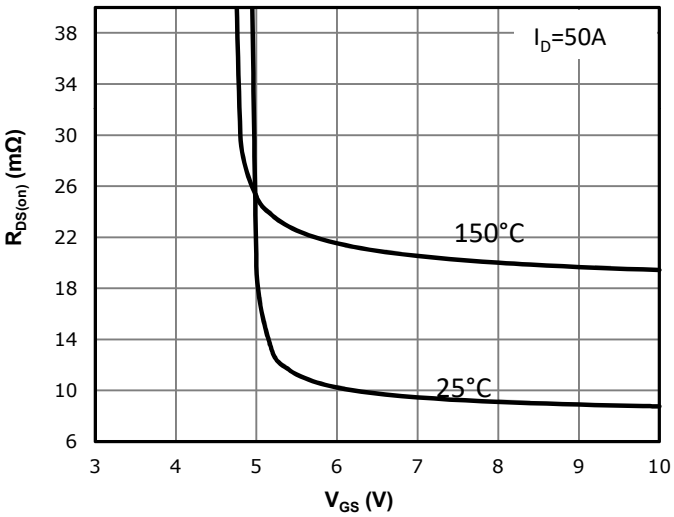


Fig 5: Rds(on) vs. Temperature

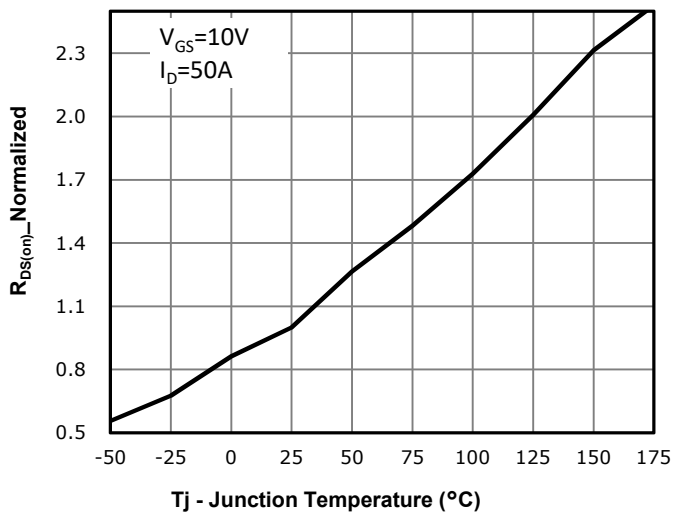
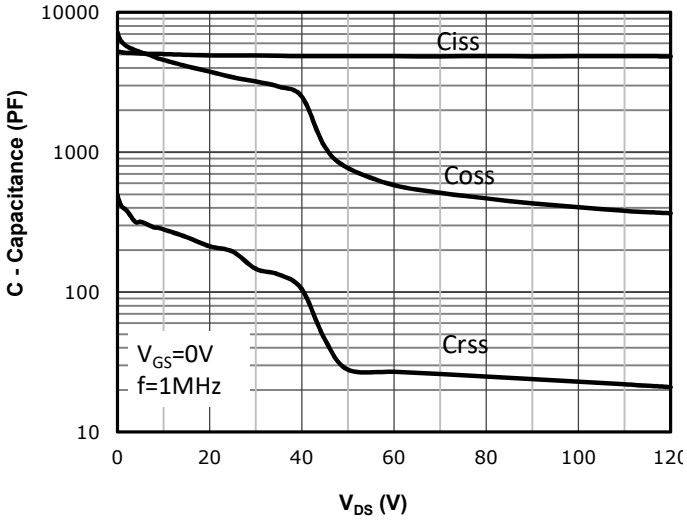


Fig 6: Capacitance Characteristics



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Fig 7: Vgs(th) vs. Temperature

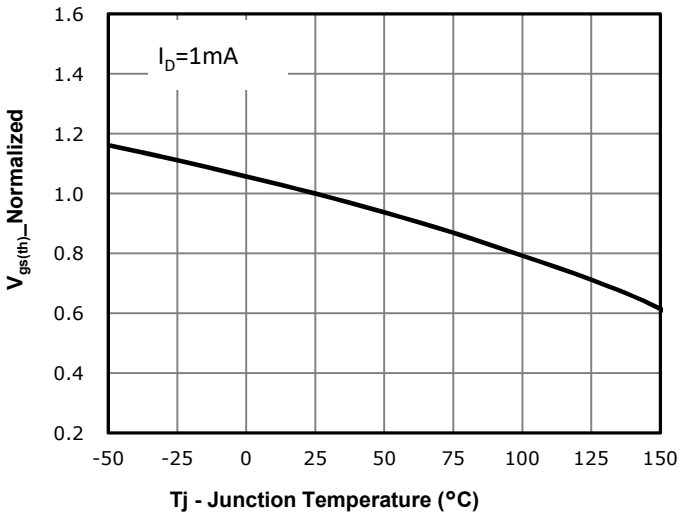


Fig 8: BVdss vs. Temperature

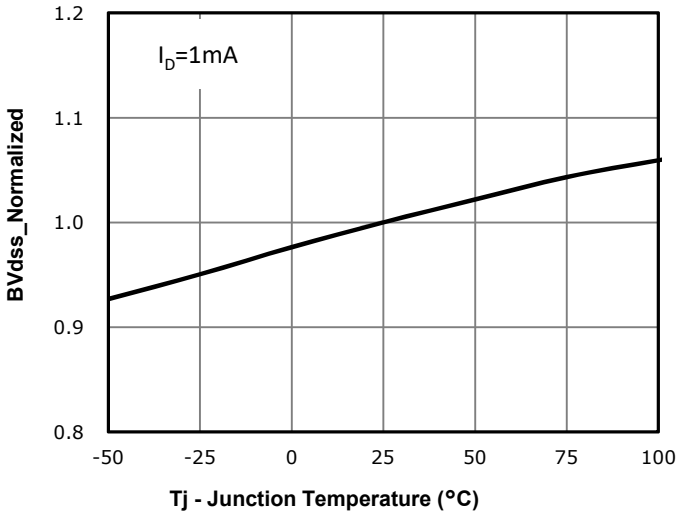


Fig 9: Gate Charge Characteristics

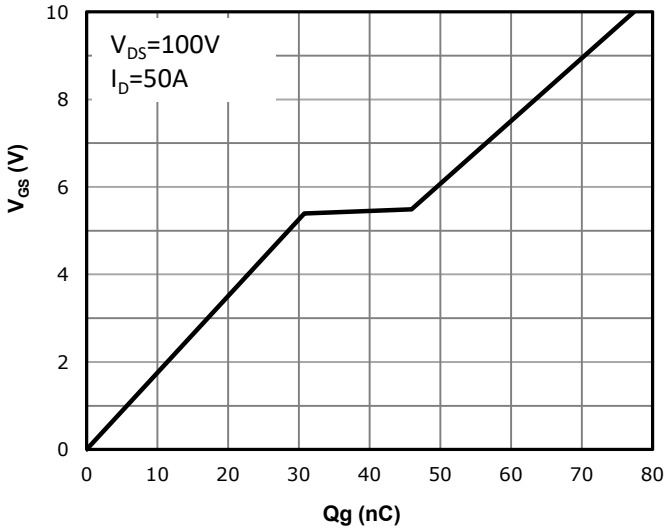


Fig 10: Body-diode Forward Characteristics

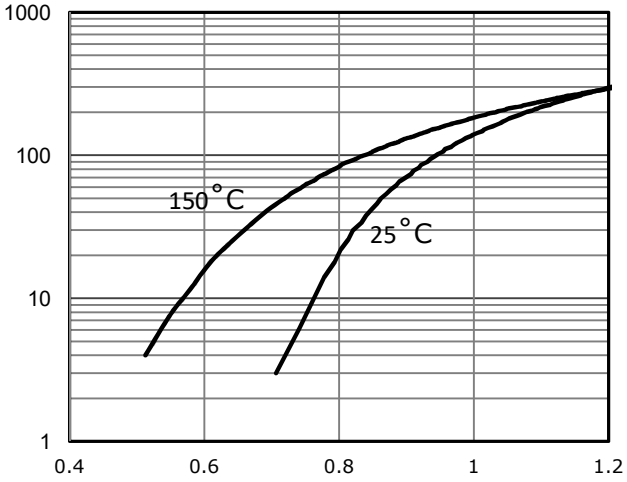


Fig 11: Power Dissipation

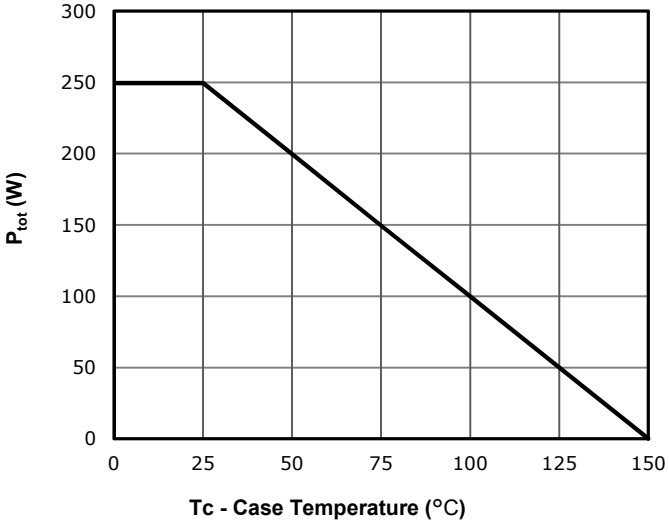
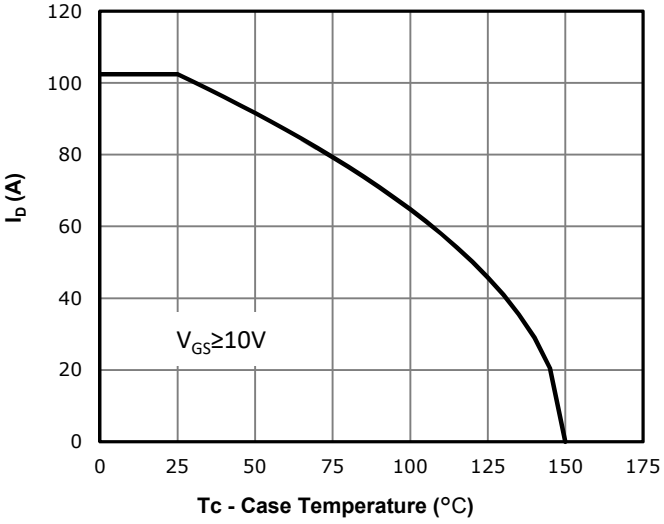
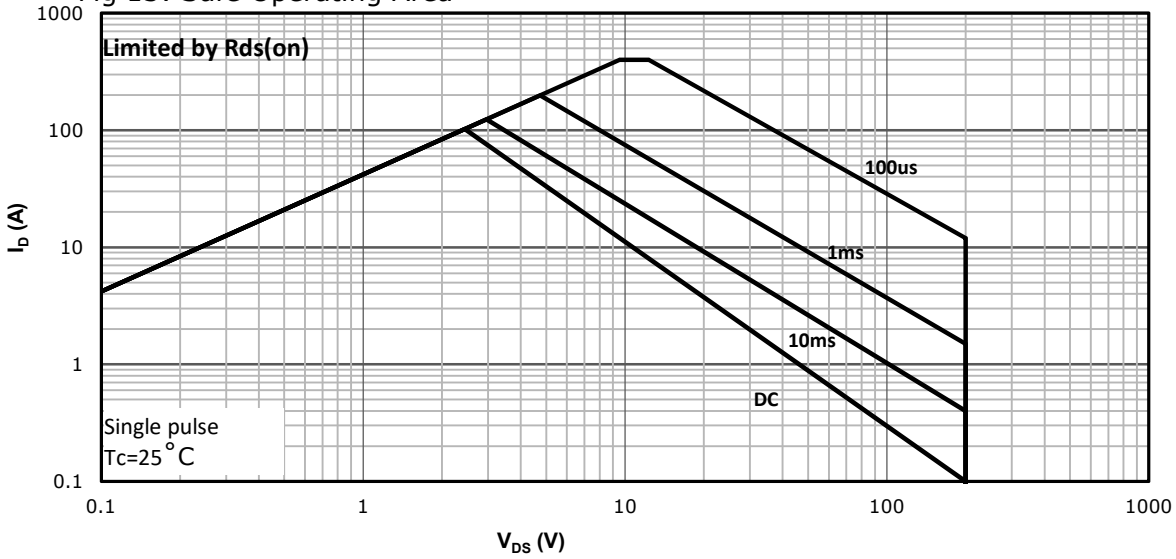


Fig 12: Drain Current Derating



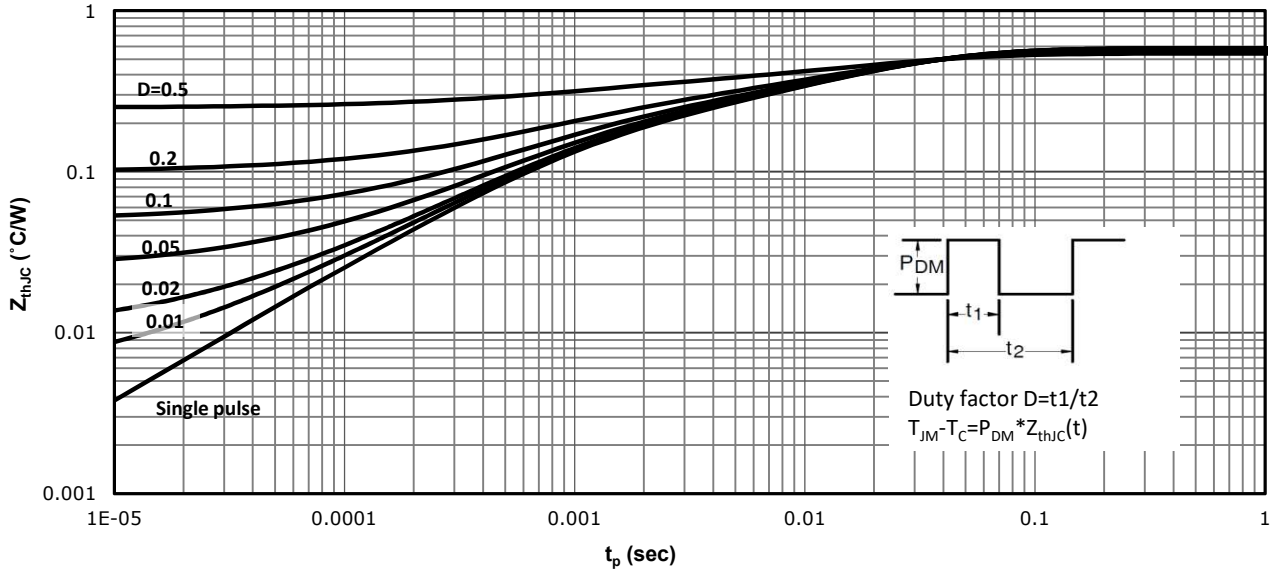
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Fig 13: Safe Operating Area



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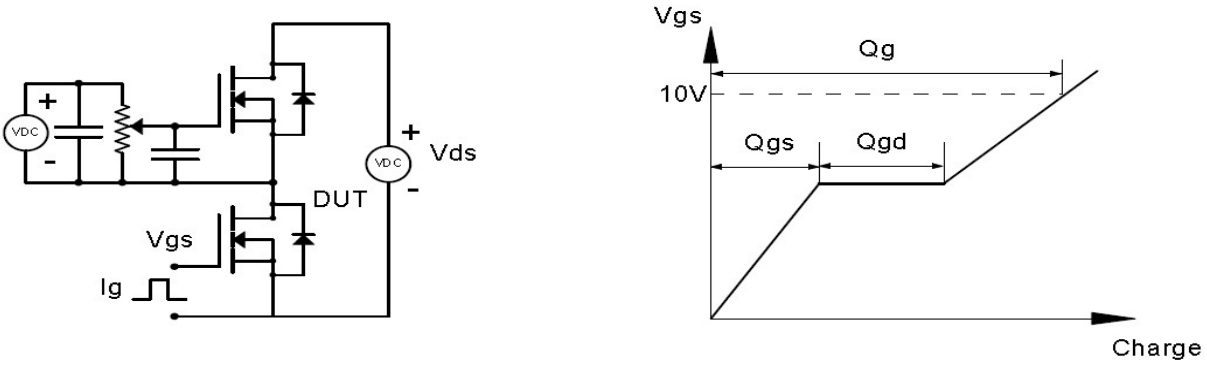
Fig 12: Max. Transient Thermal Impedance



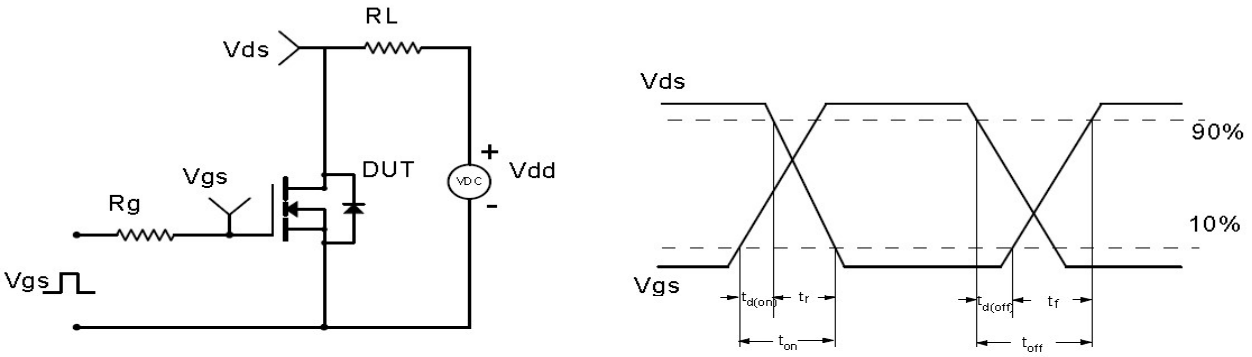
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Test Circuit & Waveform

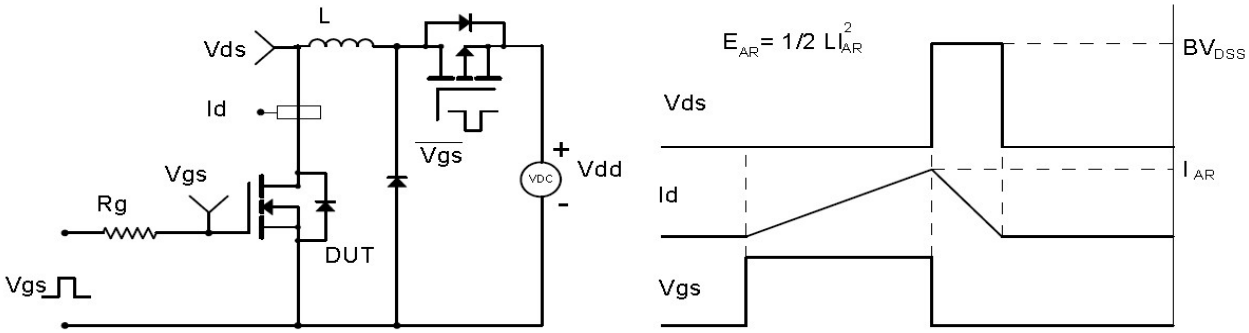
Gate Charge Test Circuit & Waveform



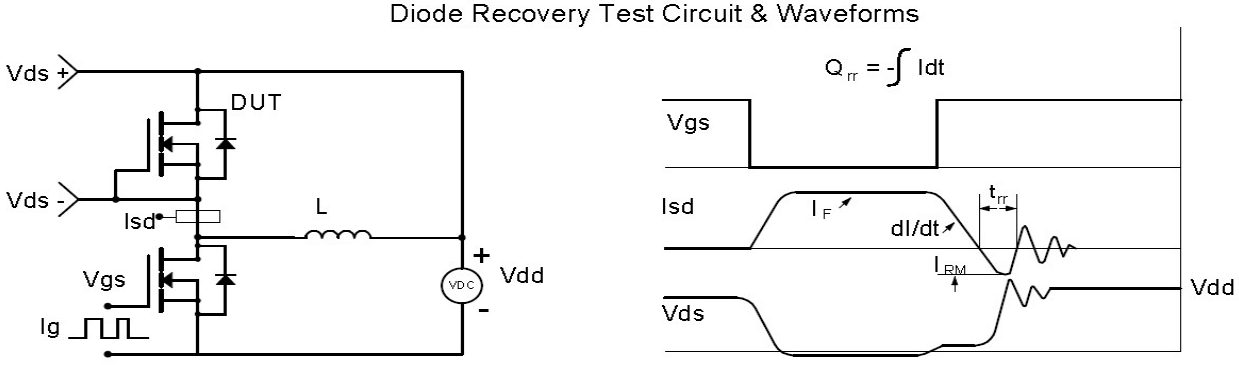
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

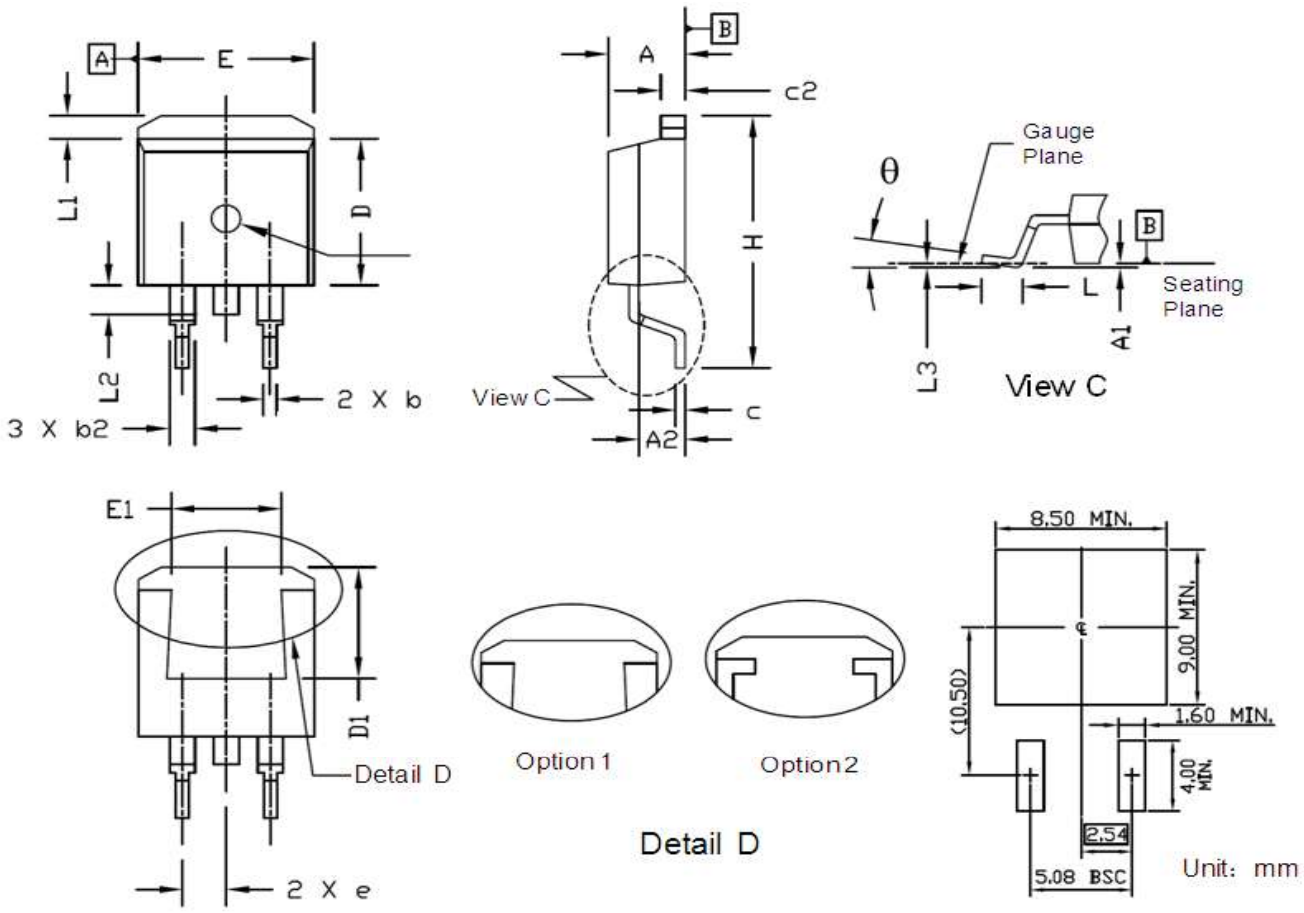


Diode Recovery Test Circuit & Waveforms



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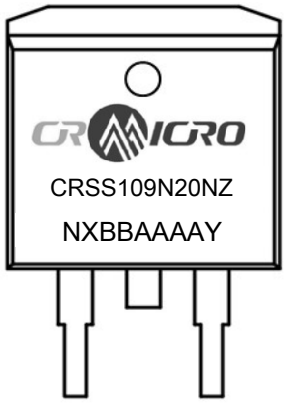
Package Outline: TO-263



Symbol		Dimensions In Millimeters		Dimensions In Inches	
		Min.	Max.	Min.	Max.
A		4.30	4.86	0.169	0.191
A1		0.00	0.25	0.000	0.010
A2		2.34	2.79	0.092	0.110
b		0.68	0.94	0.027	0.037
b2		1.14	1.78	0.045	0.070
c		0.33	0.65	0.013	0.026
c2		1.17	1.40	0.046	0.055
D		8.38	9.45	0.330	0.372
D1		6.90	8.17	0.272	0.322
e		2.54 BSC.		0.100 BSC.	
E		9.78	10.50	0.385	0.413
E1		6.50	8.60	0.256	0.339
H		14.61	15.88	0.575	0.625
L		1.78	2.79	0.070	0.110
L1		0.70	1.60	0.028	0.063
L2		1.00	1.78	0.039	0.070
L3		0.25 BSC.		0.010 BSC.	
θ	Option A	-8°	0°	-8°	0°
	Option B	0°	8°	0°	8°

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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

Revison	Date	Major changes
1.0	2022/8/30	Release of formal version.
2.0	2023/6/12	Update RDS(on) Value max.
3.0	2023/8/1	Update Package QTY.

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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