华润微电子(重庆)有限公司

CRSS109N20NZ-Q

SkyMOS3 N-MOSFET 200V, 8.5mΩ, 105A

Features

- Uses CRM(CQ) advanced SkyMOS3 technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent Q_gx$R_{DS(on)}$ product(FOM)
- AEC-Q101 Criteria Qualified
- 175°C Operating Temperature

Applications

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

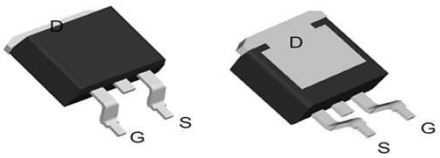
Product Summary

V_{DS}	200V
$R_{DS(on)}$	8.5mΩ
I_D	105A

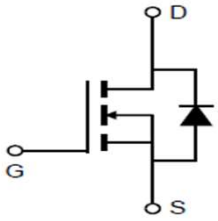
100% Avalanche Tested
100% DVDS Tested

RoHS HF

TO-263



CRSS109N20NZ-Q



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSS109N20NZ-Q	CRSS109N20NZ	TO-263	Tape& Reel	N/A	N/A	800pcs 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	 105 160 74	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	420	A
Avalanche energy, single pulse (L = 0.5mH, Rg=25Ω)	E_{AS}	306	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	299	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+175	°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 = 35A, Vgs=10V.

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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. footprint)	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}	- -	- -	1 100	μA	V_{DS}=200V,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	$R_{DS(on)}$	-	8.5	10.9	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	-	-	105	A	T_C = 25°C
Body Diode Pulsed Current	$I_{S\ pulse}$	-	-	420	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

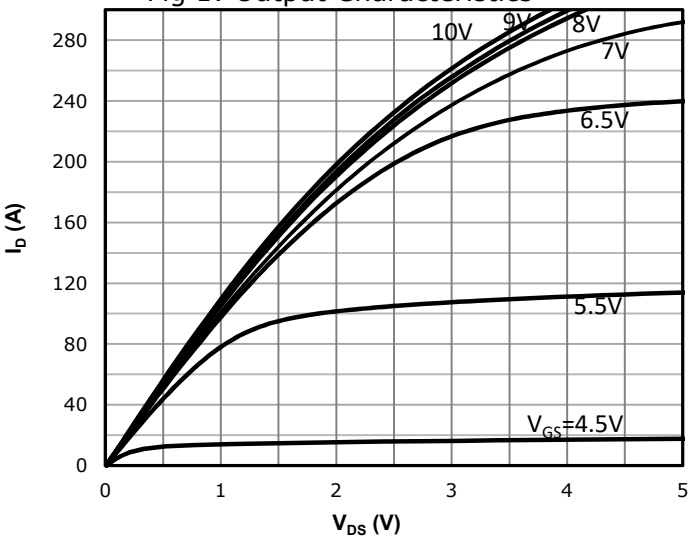


Fig 2: Transfer Characteristics

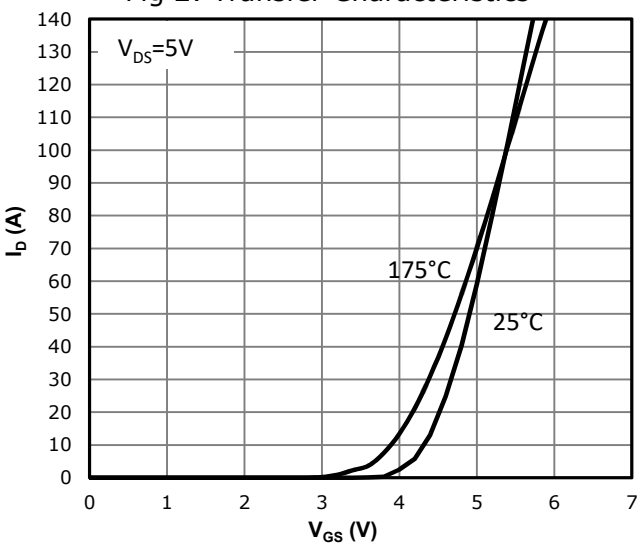


Fig 3: Rds(on) vs Drain Current and Gate Voltage

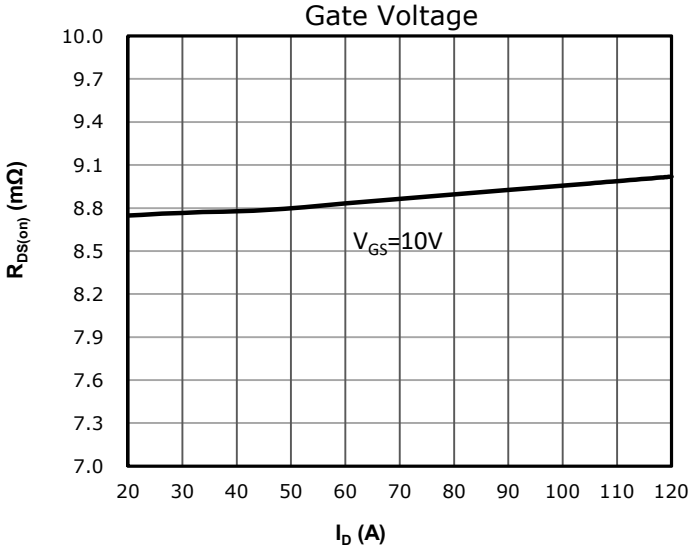


Fig 4: Rds(on) vs Gate Voltage

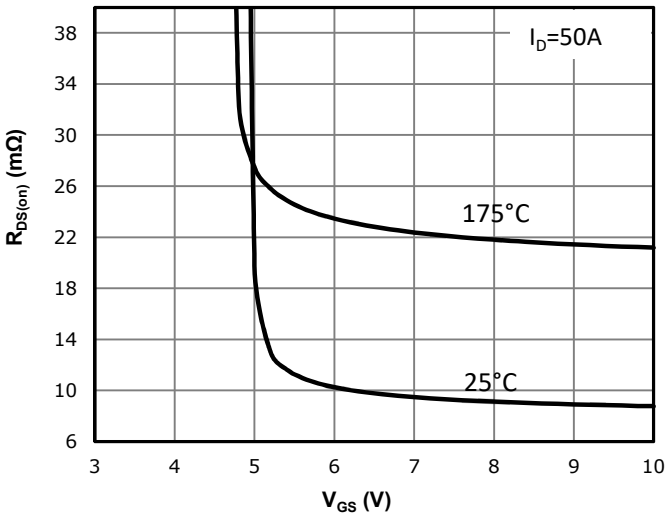


Fig 5: Rds(on) vs. Temperature

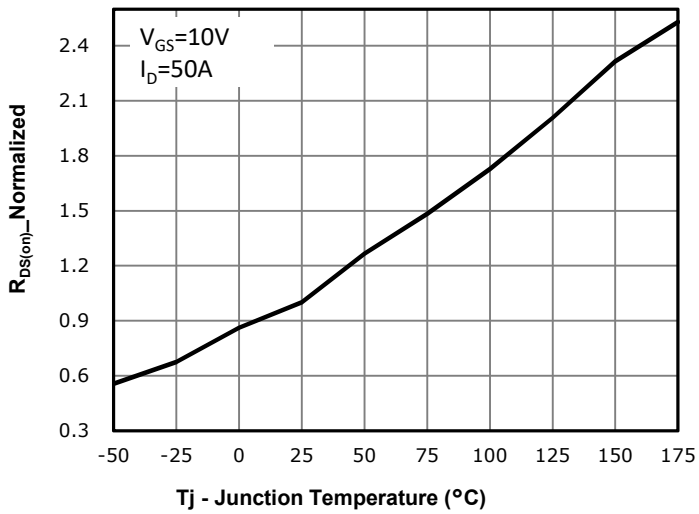
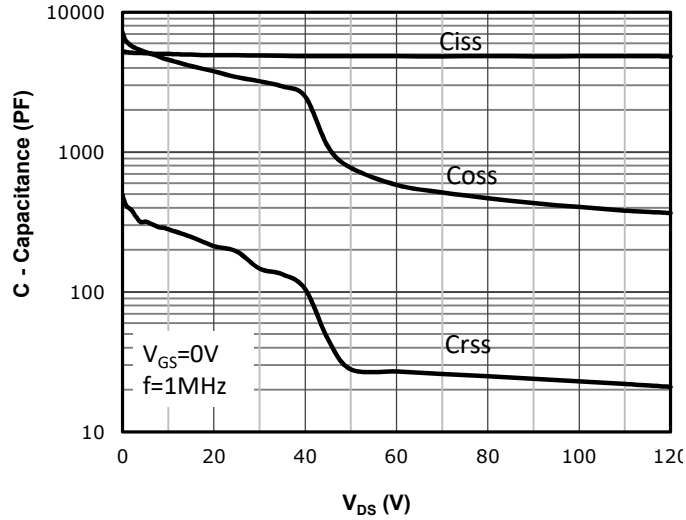


Fig 6: Capacitance Characteristics



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Fig 7: Vgs(th) vs. Temperature

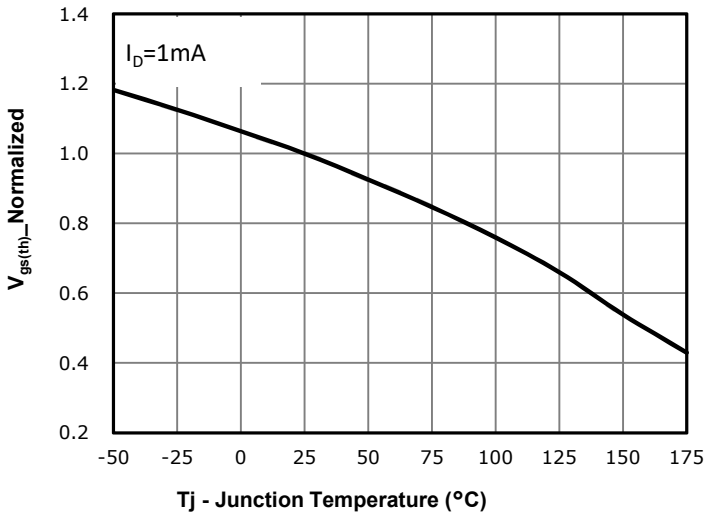


Fig 8: BVdss vs. Temperature

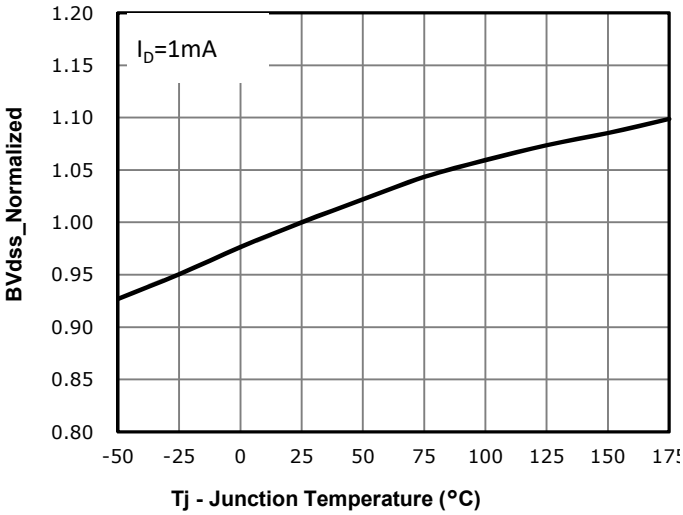


Fig 9: Gate Charge Characteristics

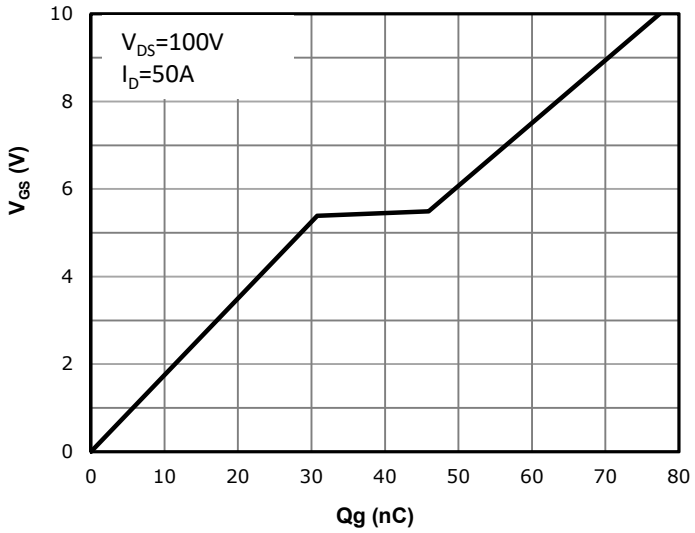


Fig 10: Body-diode Forward Characteristics

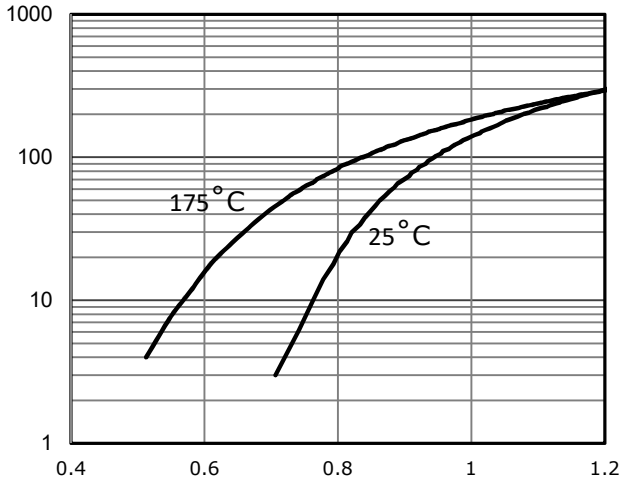


Fig 11: Power Dissipation

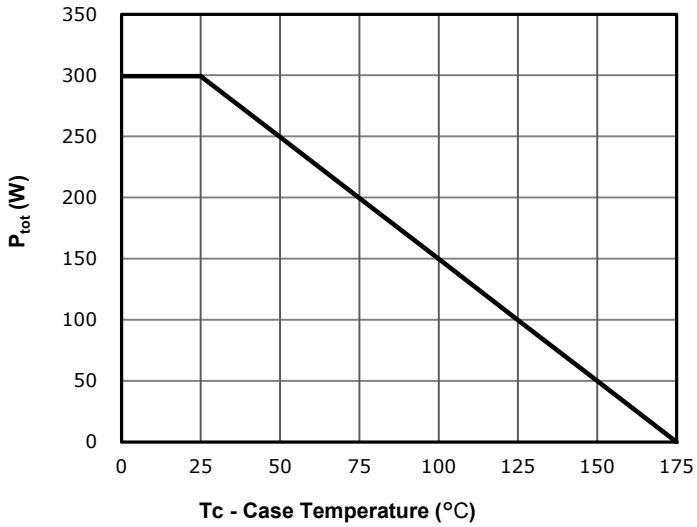
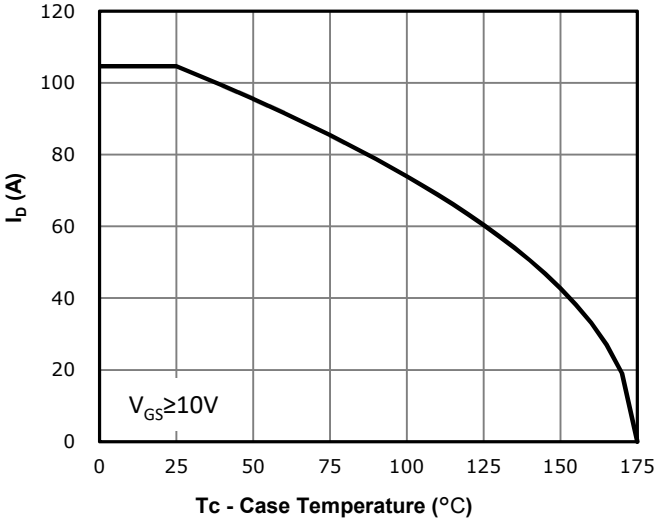


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

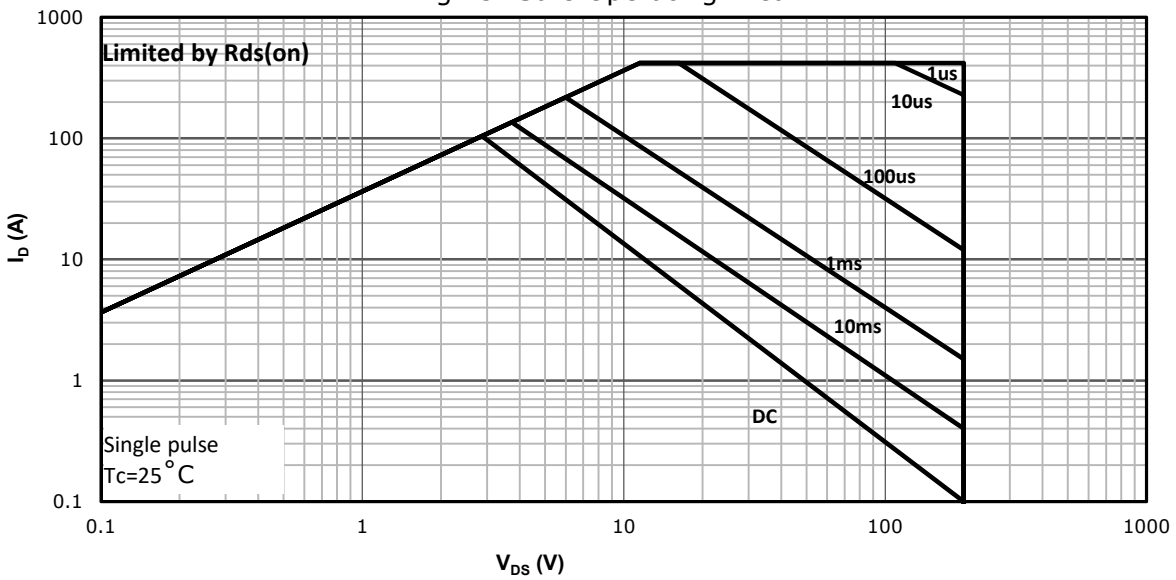
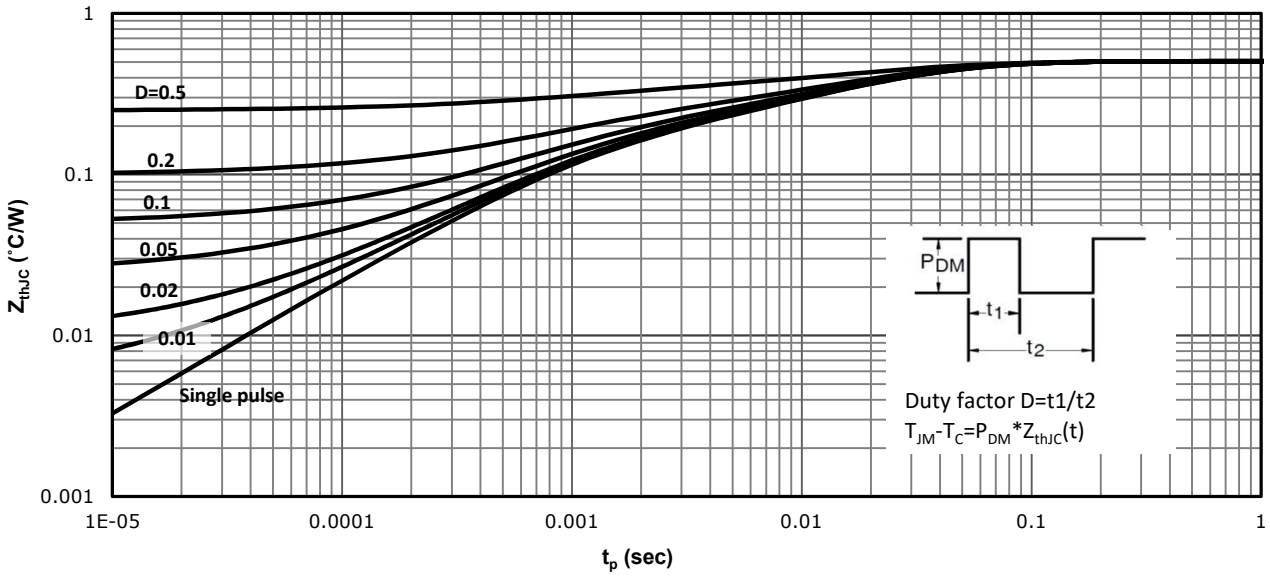


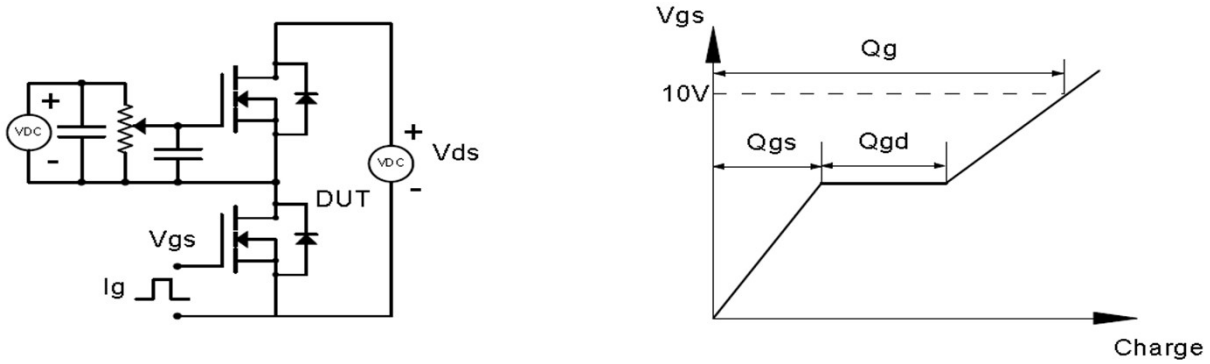
Fig 14: Max. Transient Thermal Impedance



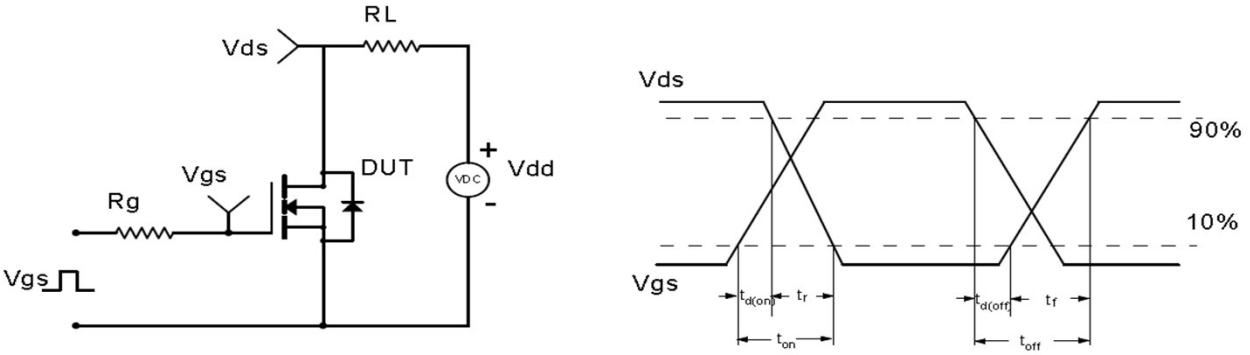
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Test Circuit & Waveform

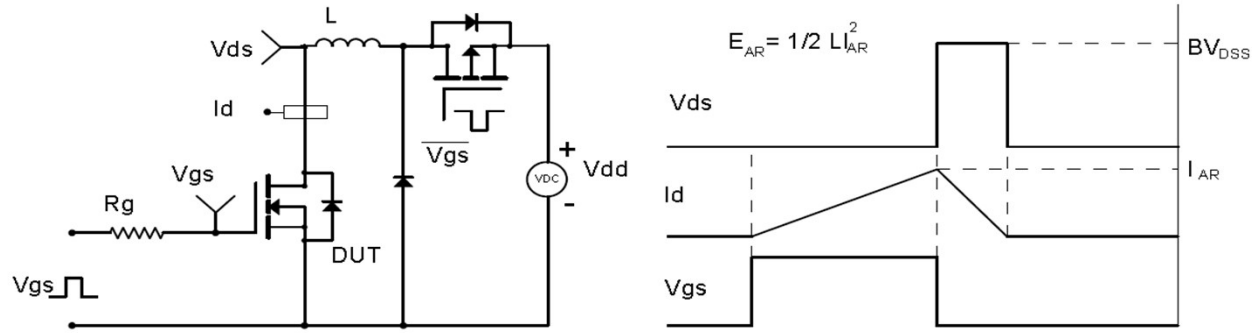
Gate Charge Test Circuit & Waveform



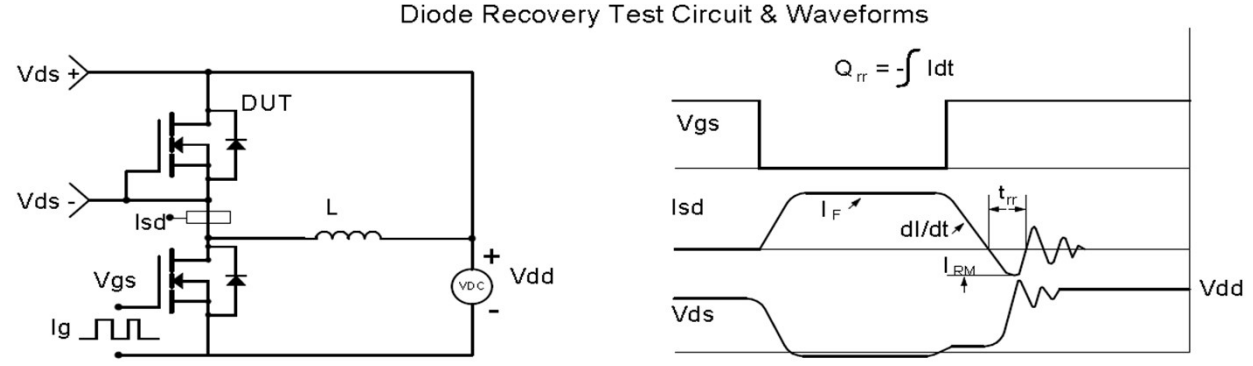
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

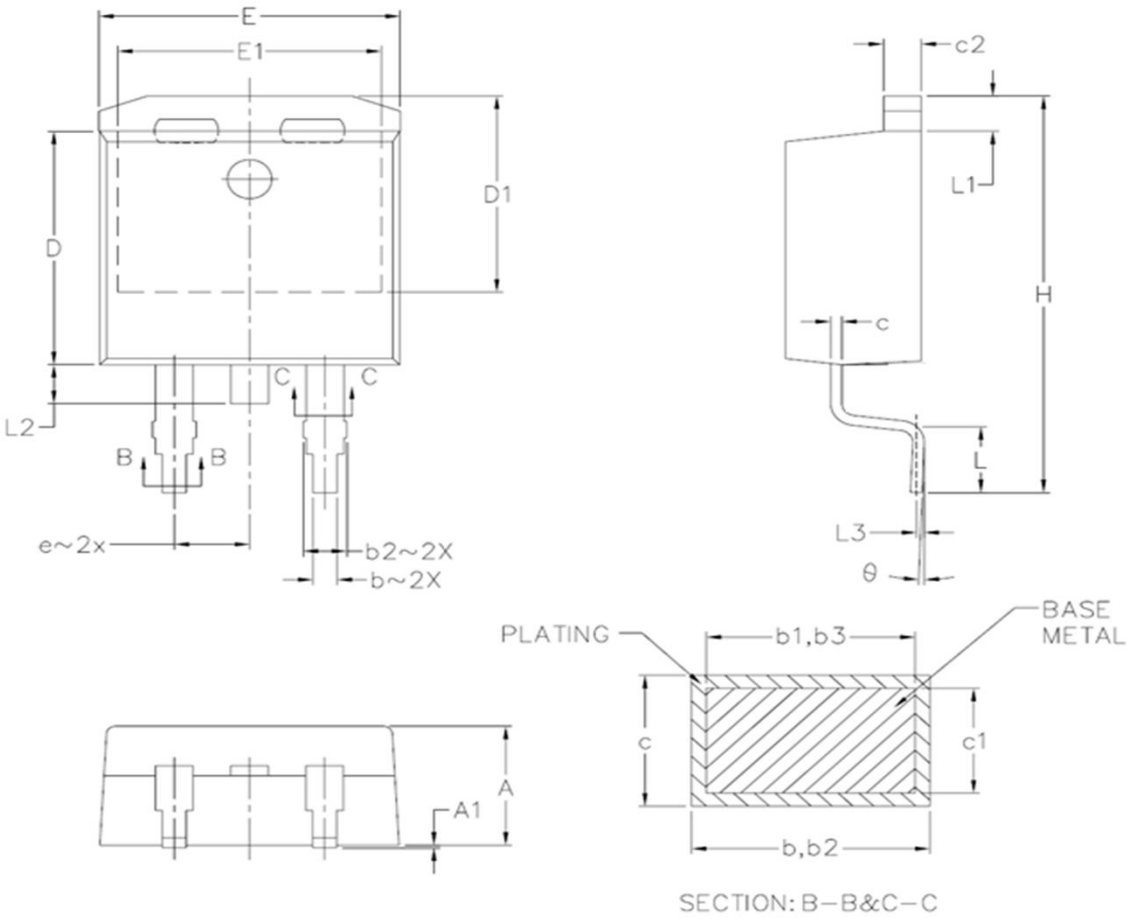


Diode Recovery Test Circuit & Waveforms



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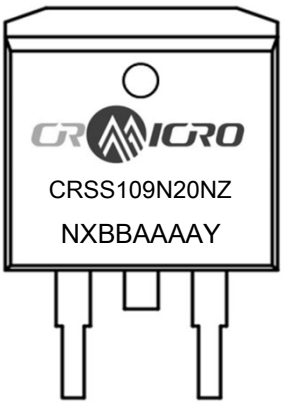
Package Outline: TO-263



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.50	0.99	0.020	0.039
b2	1.14	1.78	0.045	0.070
c	0.33	0.74	0.013	0.029
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380
D1	6.86	--	0.270	--
e	2.54 BSC.		0.100 BSC.	
E	9.65	10.67	0.380	0.420
E1	6.22	--	0.245	--
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	--	1.68	--	0.066
L2	--	1.78	--	0.070
L3	0.254 BSC.		0.010 BSC.	
θ	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	2023/5/15	Release of formal version.

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