CRSZ038N14N3Z

SkyMOS3 N-MOSFET 135V, 2.9mΩ, 190A

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

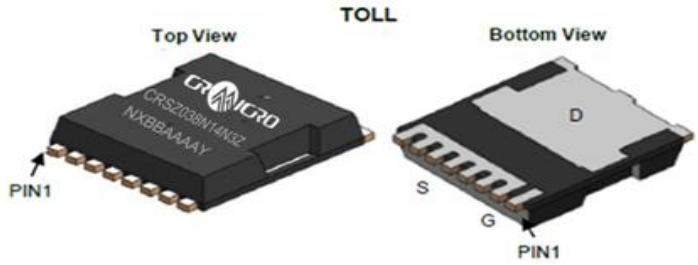
- Motor control and drive
- Battery management System
- UPS (Uninterrupible Power Supplies)

Product Summary

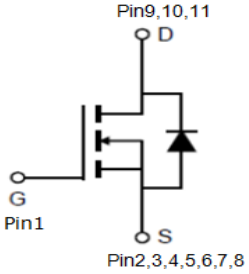
V_{DS}	135V
$R_{DS(on).typ}$	2.9mΩ
I_D	190A

100% DVDS Tested
100% Avalanche Tested

RoHS HF



CRSZ038N14N3Z



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSZ038N14N3Z	CRSZ038N14N3Z	TOLL	Tape&Reel	N/A	N/A	2000pcs

Absolute Maximum Ratings

Parameter	**Symbol**	**Value**	**Unit**
Drain-source voltage	V_{DS}	135	V
Continuous drain current			
T_C = 25°C (Silicon limit)	I_D	190	A
T_C = 25°C (Package limit)		300	
T_C = 100°C (Silicon limit)		121	
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	760	A
Avalanche energy, single pulse (I_D = 76A, Rg=25Ω)[1]	E_{AS}	1445	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	266	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C

※. Notes:
1.EAS is tested at starting Tj = 25℃, L = 0.5mH, IAS =76A, VGS = 10V.

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Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	0.47	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	45	

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}	135	-	-	V	V_{GS}=0V, I_D=250uA
		135	-	-	V	V_{GS}=0V, I_D=1mA
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	μA	V_{DS}=135V,V_{GS}=0V T_j=25°C
		-	-	100		T_j=125°C
Gate-source leakage current	I_{GSS}	0	-	±100	nA	V_{GS}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	2.9	3.8	mΩ	VGS=10V, ID=90A
Transconductance	g_{fs}	101.4	202.7	405.4	S	V_{DS}=5V, I_D=90A
Dynamic Characteristic						
Input Capacitance	C_{iss}	6534	9801	14702	pF	V_{GS}=0V, V_{DS}=68V, f=1MHz
Output Capacitance	C_{oss}	557	835	1253		
Reverse Transfer Capacitance	C_{rss}	16	32	64		
Gate Total Charge	Q_G	98.5	147.7	221.5	nC	V_{GS}=10V, V_{DS}=68V, I_D=90A
Gate-Source charge	Q_{gs}	38.7	58.1	87.2		
Gate-Drain charge	Q_{gd}	14.1	28.2	56.4		
Turn-on delay time	$t_{d(on)}$	-	38.0	-	ns	V_{GS}=10V, V_{DD}=68V, R_{G_ext}=2.7Ω
Rise time	t_r	-	67.7	-		
Turn-off delay time	$t_{d(off)}$	-	84.4	-		
Fall time	t_f	-	33.9	-		
Gate resistance	R_G	-	2.6	-	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}	-	0.86	1.4	V	V_{GS}=0V,I_{SD}=90A
Body Diode Reverse Recovery Time	t_{rr}	-	95.3	-	ns	I_F=90A,dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	337.4	-	nC	

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Typical Performance Characteristics

Fig 1: Output Characteristics

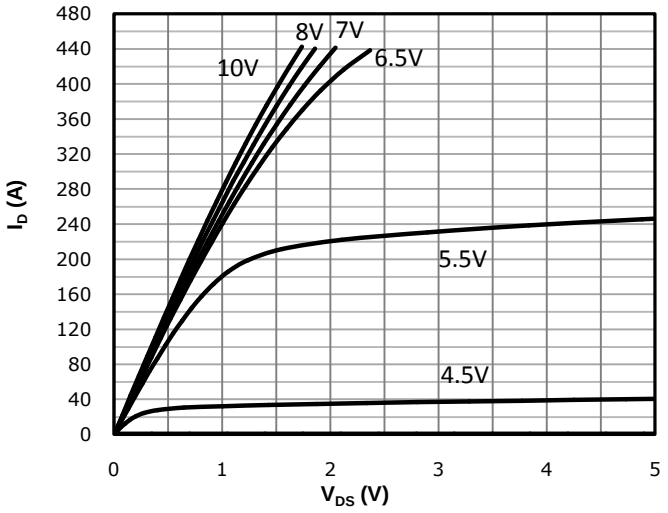


Fig 2: Transfer Characteristics

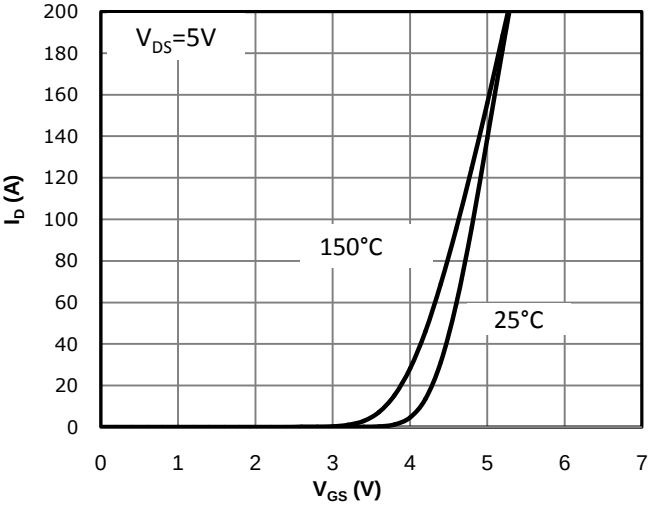


Fig 3: Rds(on) vs Drain Current and Gate Voltage

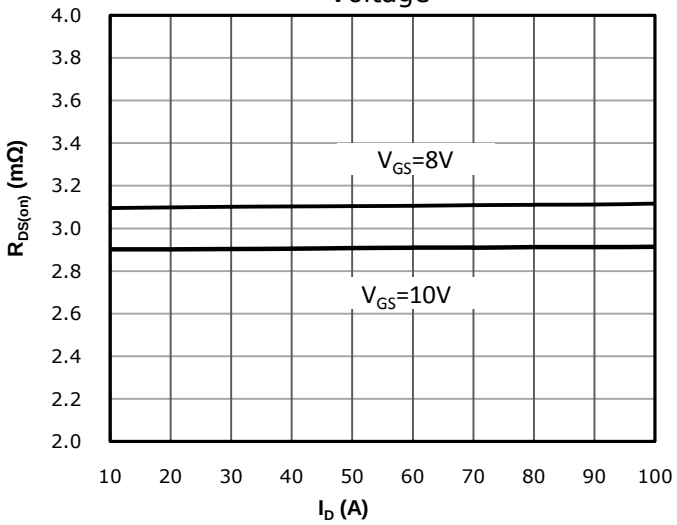


Fig 4: Rds(on) vs Gate Voltage

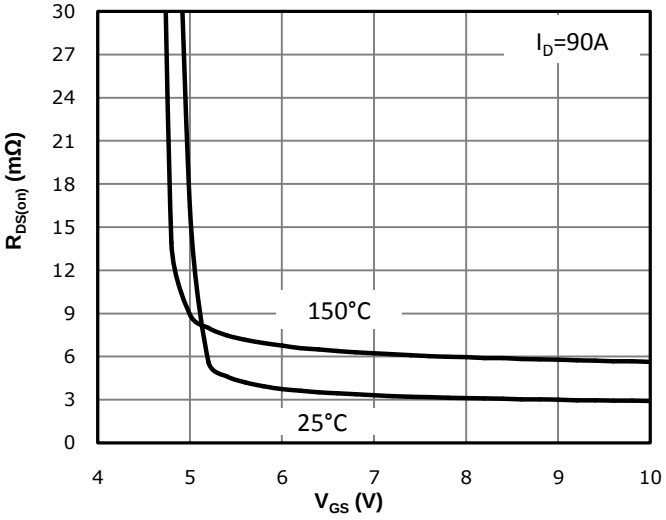


Fig 5: Rds(on) vs. Temperature

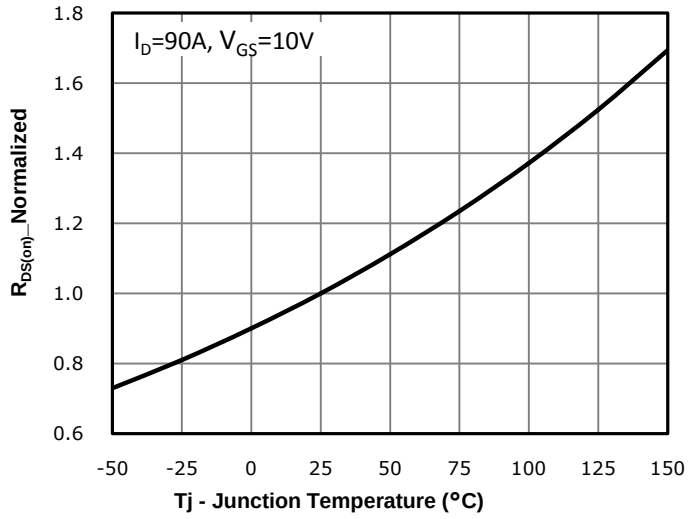
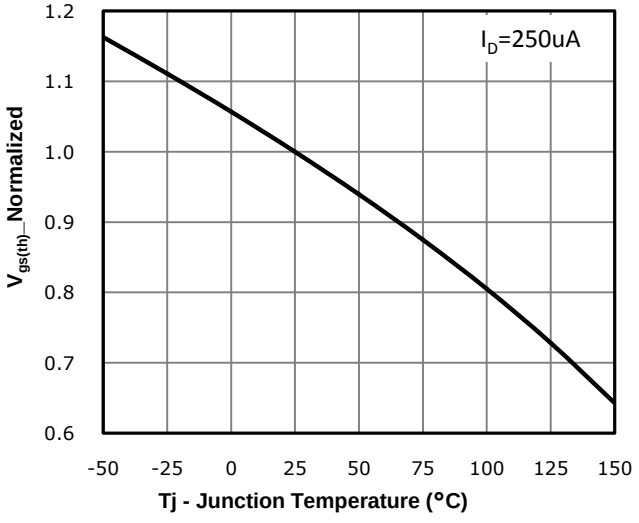


Fig 6: Vgs(th) vs. Temperature



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Fig 7: BVdss vs. Temperature

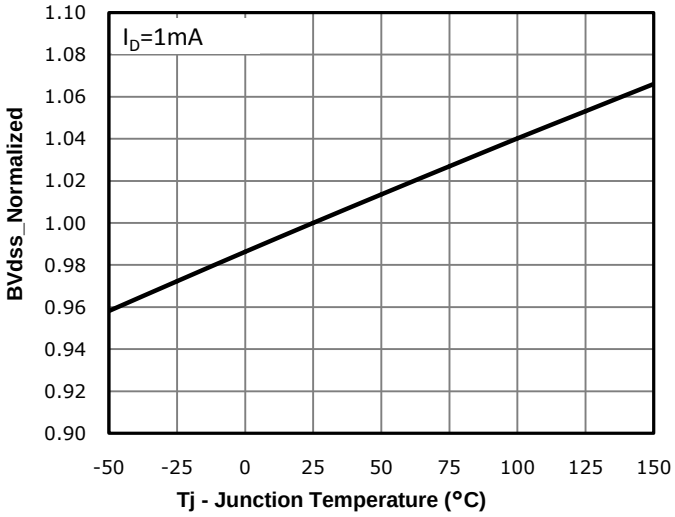


Fig 8: Capacitance Characteristics

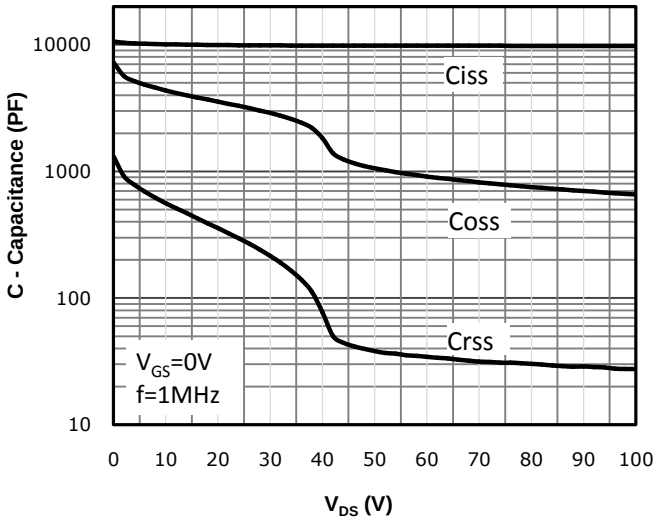


Fig 9: Gate Charge Characteristics

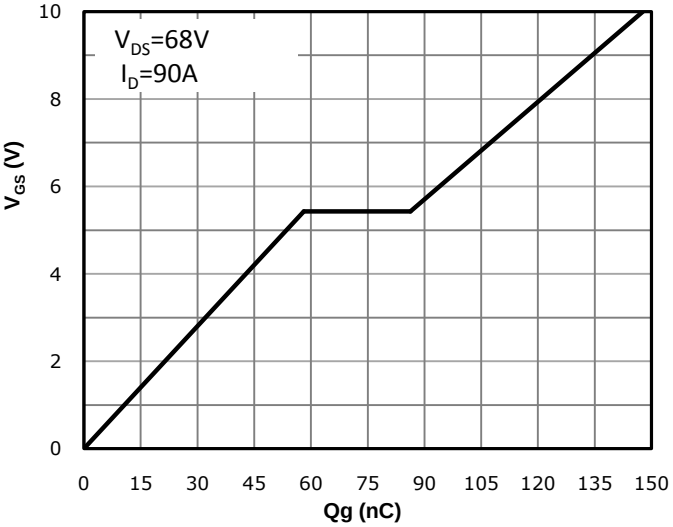


Fig 10: Body-diode Forward Characteristics

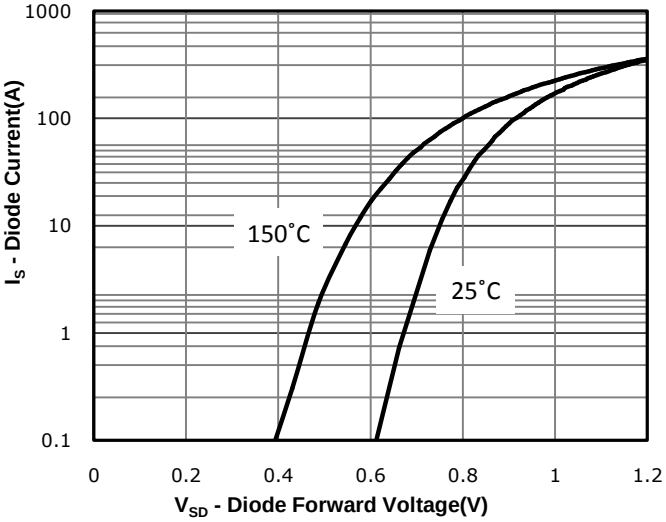


Fig 11: Power Dissipation

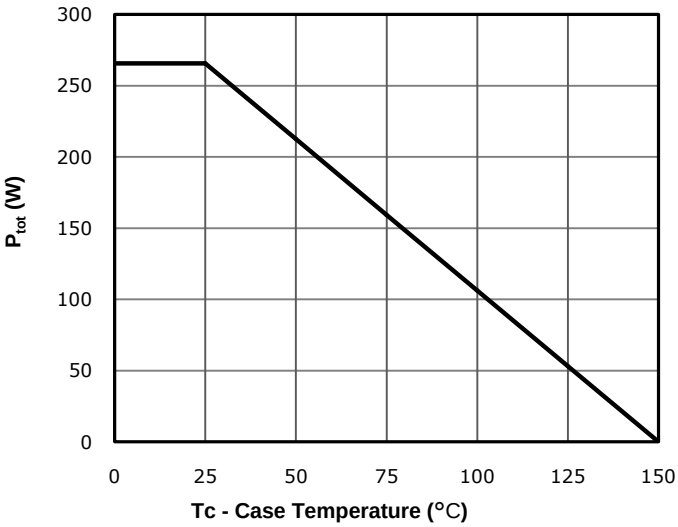
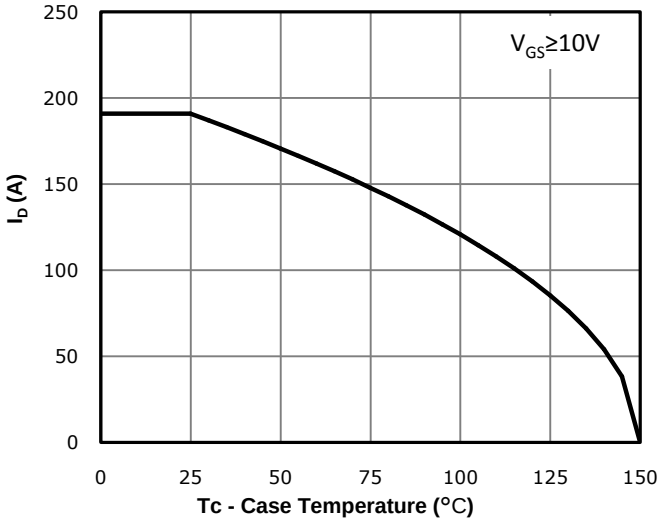


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

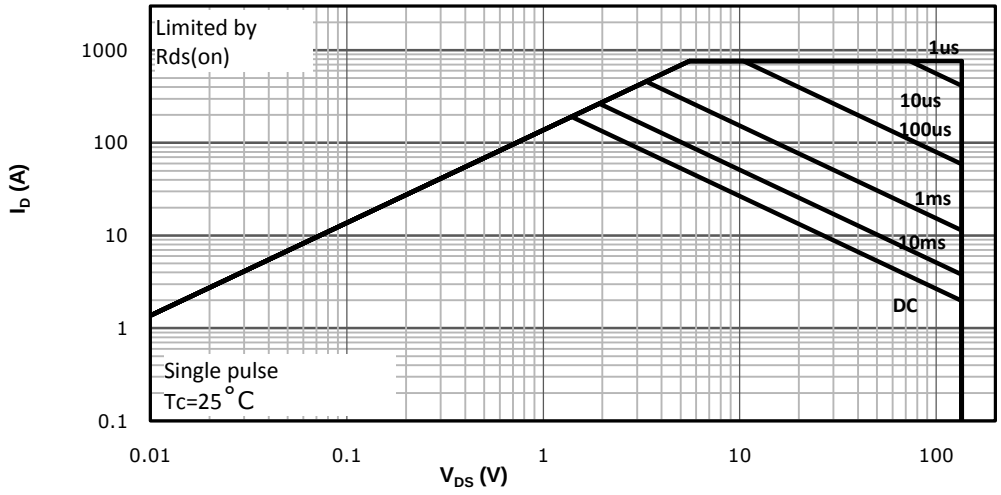
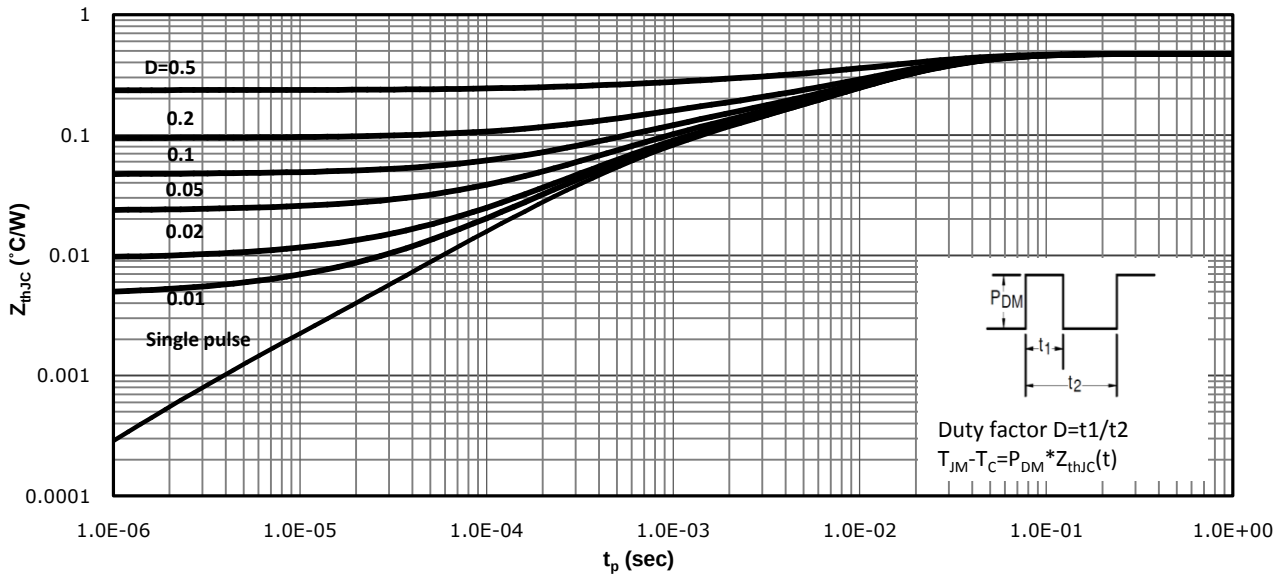


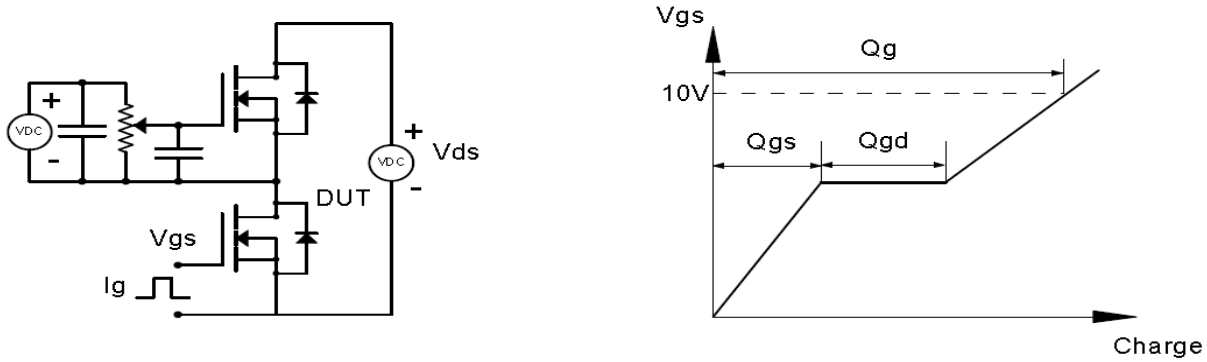
Fig 14: Max. Transient Thermal Impedance



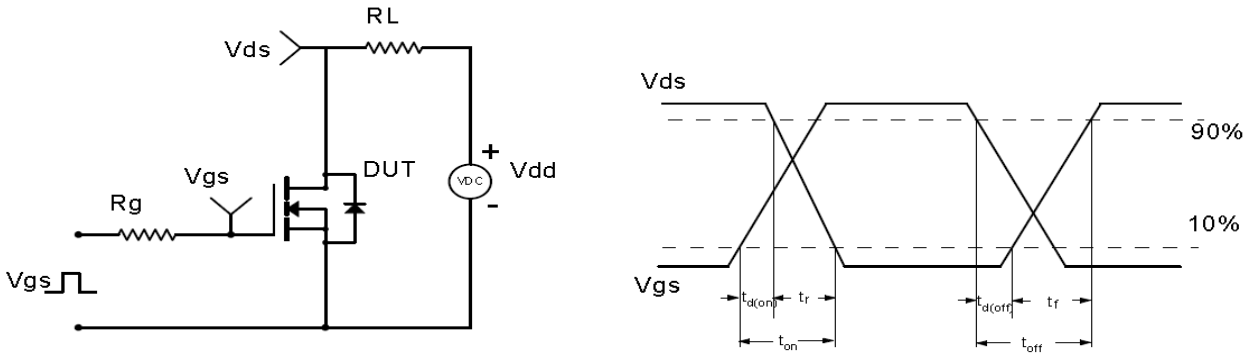
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Test Circuit & Waveform

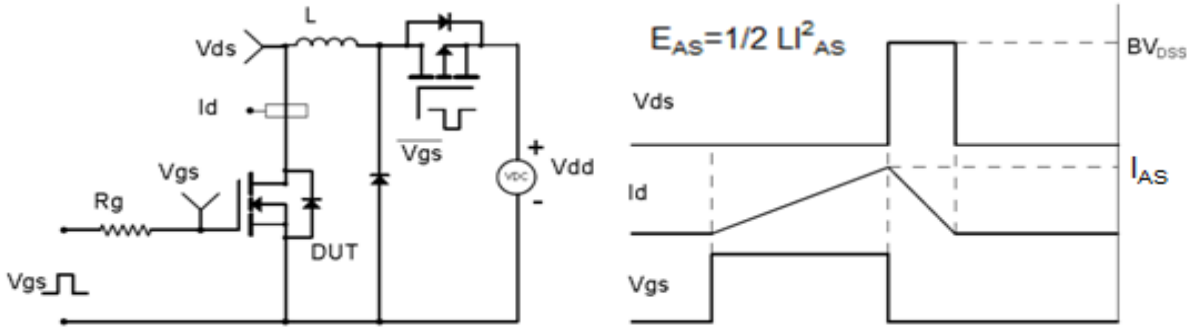
Gate Charge Test Circuit & Waveform



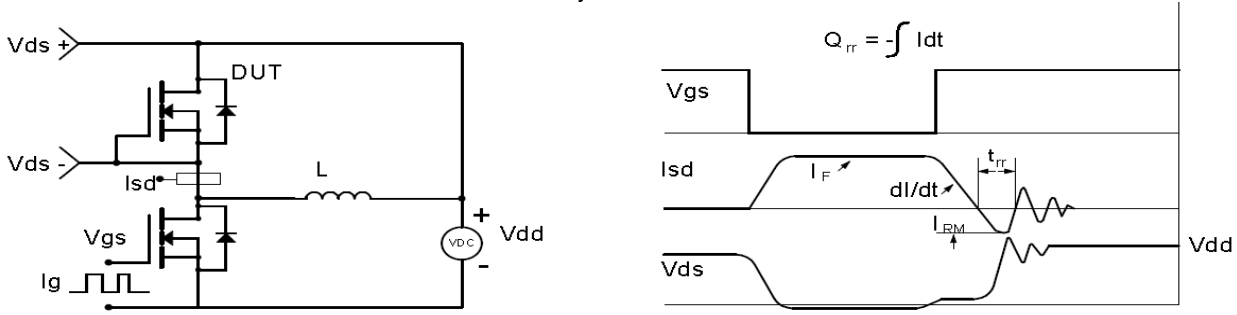
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

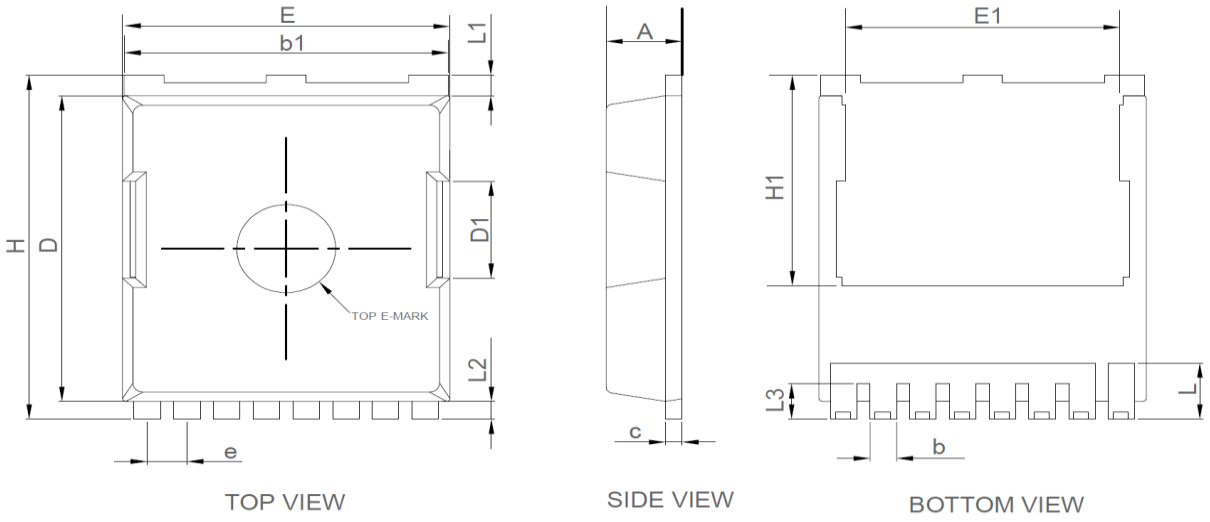


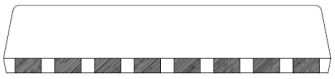
Diode Recovery Test Circuit & Waveforms



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Package Outline: TOLL





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.15	2.45	0.085	0.096
b	0.60	0.90	0.024	0.035
b1	9.65	9.95	0.380	0.392
c	0.35	0.65	0.014	0.026
D	10.18	10.70	0.401	0.421
D1	3.15	3.45	0.124	0.136
E	9.70	10.10	0.382	0.398
E1	7.35	8.45	0.289	0.333
e	1.10	1.30	0.043	0.051
H	11.45	11.95	0.451	0.470
H1	6.55	7.50	0.258	0.295
L	1.35	2.10	0.053	0.083
L1	0.50	0.90	0.020	0.035
L2	0.40	0.80	0.016	0.031
L3	0.95	1.35	0.037	0.053

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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	2023/12/19	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 semiconductor 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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