华润微电子(重庆)有限公司

CRSQ016N10N4Z

SkyMOS4 N-MOSFET 100V, 1.8mΩ, 250A

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

Product Summary

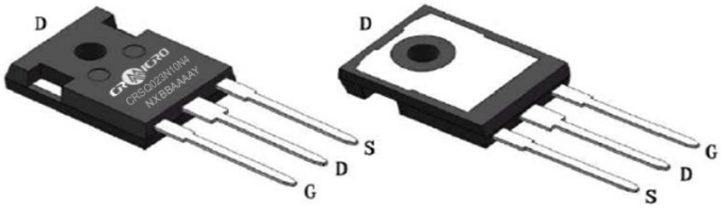
V_{DS}	100V
$R_{DS(on).typ}$	1.8mΩ
I_D	250A

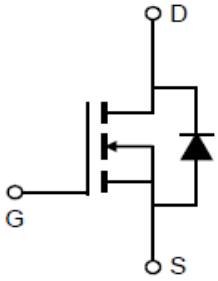
100% DVDS Tested
100% Avalanche Tested

Applications

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

TO-247





CRSQ016N10N4Z

Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSQ016N10N4Z	CRSQ016N10N4Z	TO-247	Tube	N/A	N/A	25pcs

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	 300 250 189	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 = 77A, Rg=25Ω)[1]	E_{AS}	2958	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	339	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C

※. Notes:
1.EAS is tested at starting Tj = 25℃, L = 1mH, IAS =77A, 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}	0.37	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	42	

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
		100	-	-	V	V_{GS}=0V, I_D=1mA
Gate threshold voltage	$V_{GS(th)}$	2.2	3.0	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	$R_{DS(on)}$		1.8	2.3	mΩ	VGS=10V, ID=100A
Transconductance	g_{fs}	151.35	302.7	605.4	S	V_{DS}=5V, I_D=100A
Dynamic Characteristic						
Input Capacitance	C_{iss}	8117	12175	18262	pF	V_{GS}=0V, V_{DS}=50V, f=1MHz
Output Capacitance	C_{oss}	1216	1824	2736		
Reverse Transfer Capacitance	C_{rss}	9	18	37		
Gate Total Charge	Q_G	118	177	265	nC	V_{GS}=10V, V_{DS}=50V, I_D=100A
Gate-Source charge	Q_{gs}	49	73	110		
Gate-Drain charge	Q_{gd}	11	21	43		
Turn-on delay time	$t_{d(on)}$	15	30	60	ns	V_{GS}=10V, V_{DD}=50V, R_{G_ext}=3Ω
Rise time	t_r	54	81	121		
Turn-off delay time	$t_{d(off)}$	62	93	139		
Fall time	t_f	84	127	190		
Gate resistance	R_G	0	1.6	8.0	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}=100A
Body Diode Reverse Recovery Time	t_{rr}	52	104	208	ns	I_F=100A,dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	131	262	523	nC	

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Typical Performance Characteristics

Fig 1: Output Characteristics

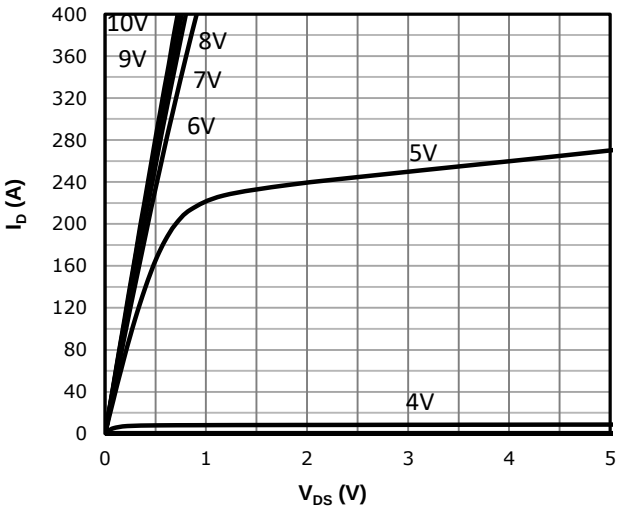


Fig 2: Transfer Characteristics

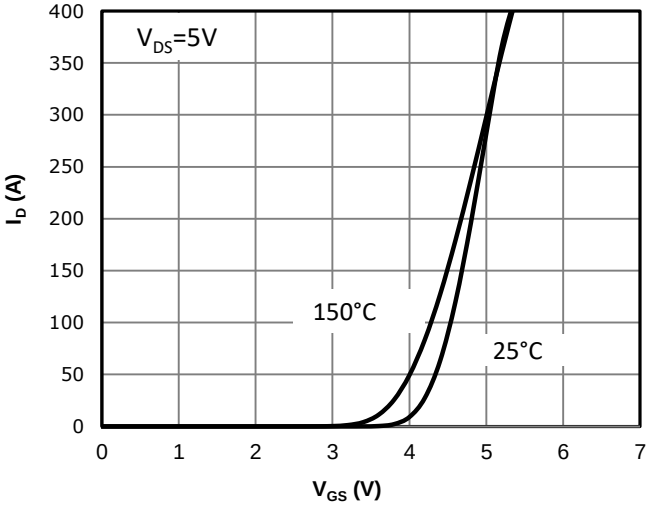


Fig 3: Rds(on) vs Drain Current and Gate Voltage

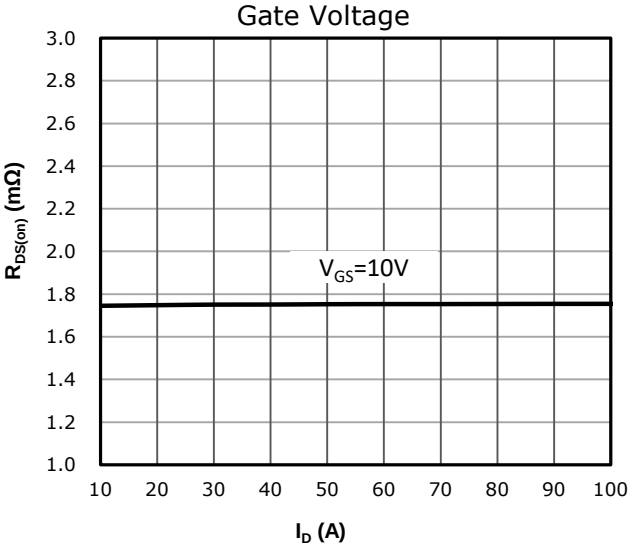


Fig 4: Rds(on) vs Gate Voltage

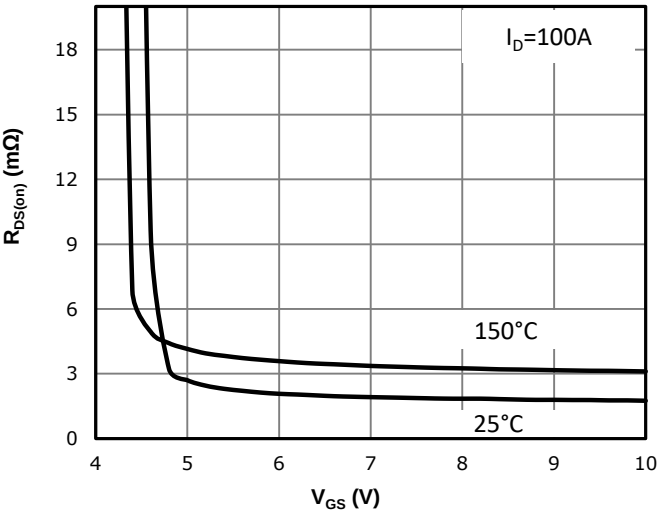


Fig 5: Rds(on) vs. Temperature

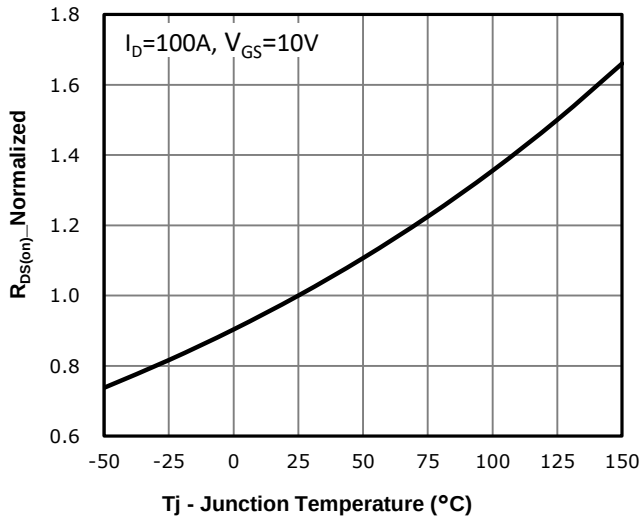
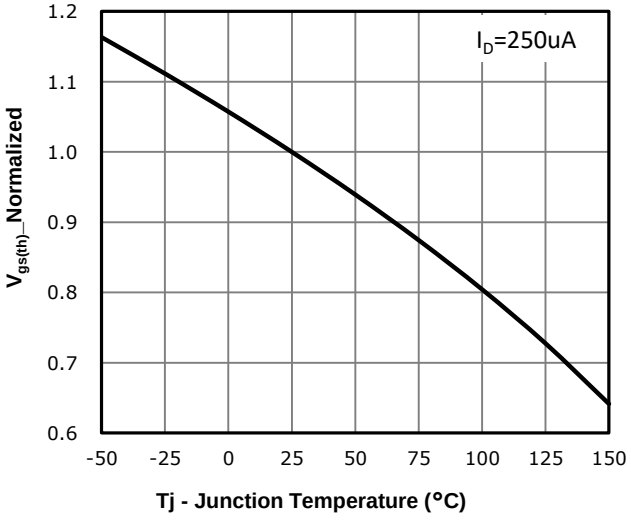


Fig 6: Vgs(th) vs. Temperature



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Fig 7: BVdss vs. Temperature

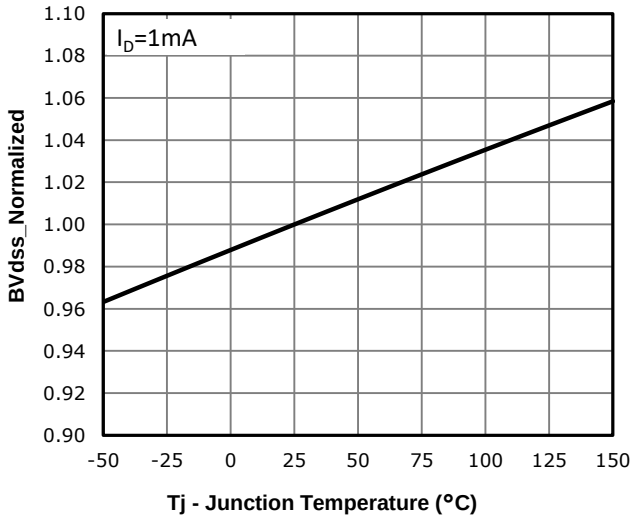


Fig 8: Capacitance Characteristics

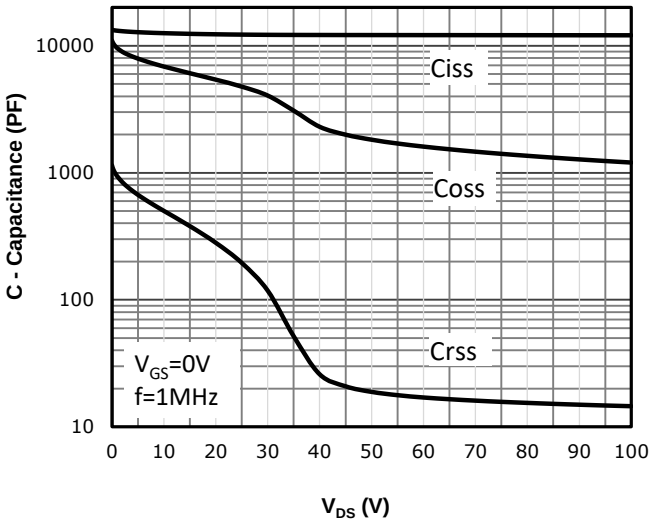


Fig 9: Gate Charge Characteristics

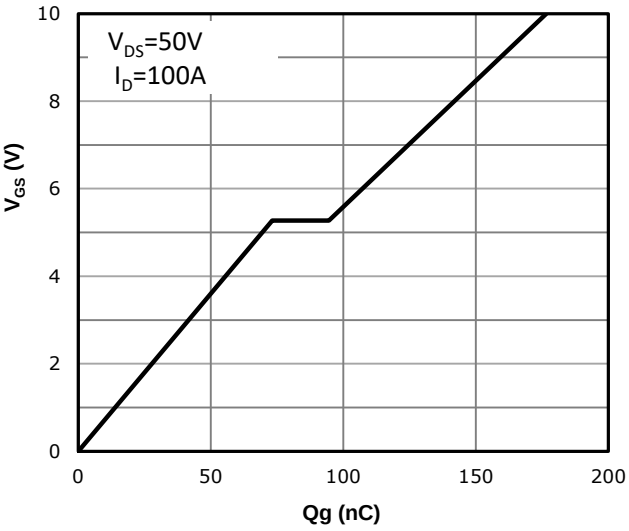


Fig 10: Body-diode Forward Characteristics

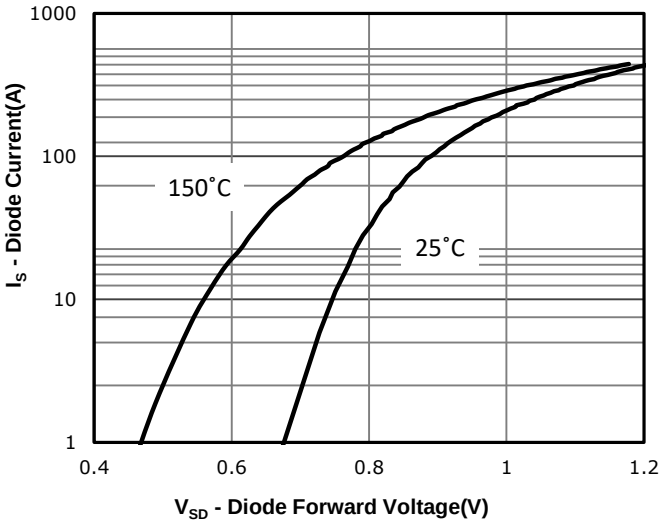


Fig 11: Power Dissipation

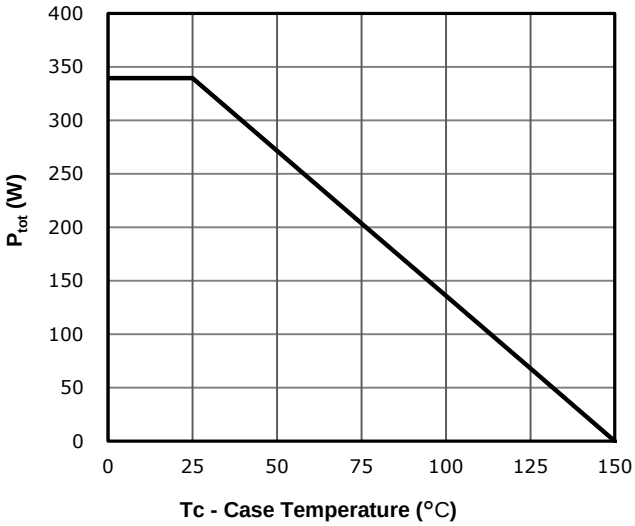
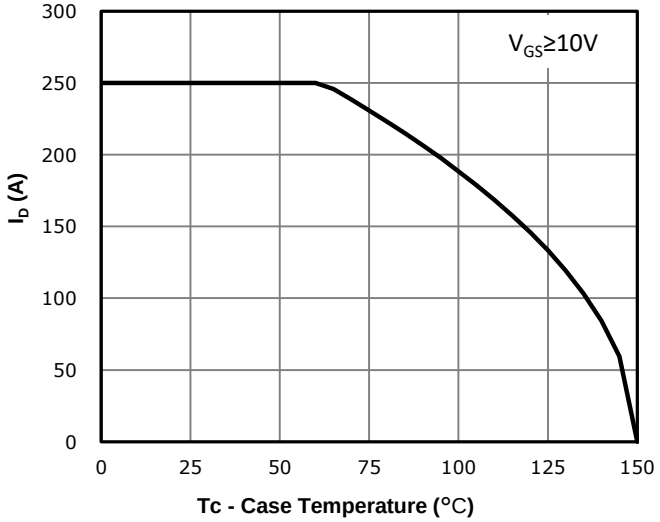


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

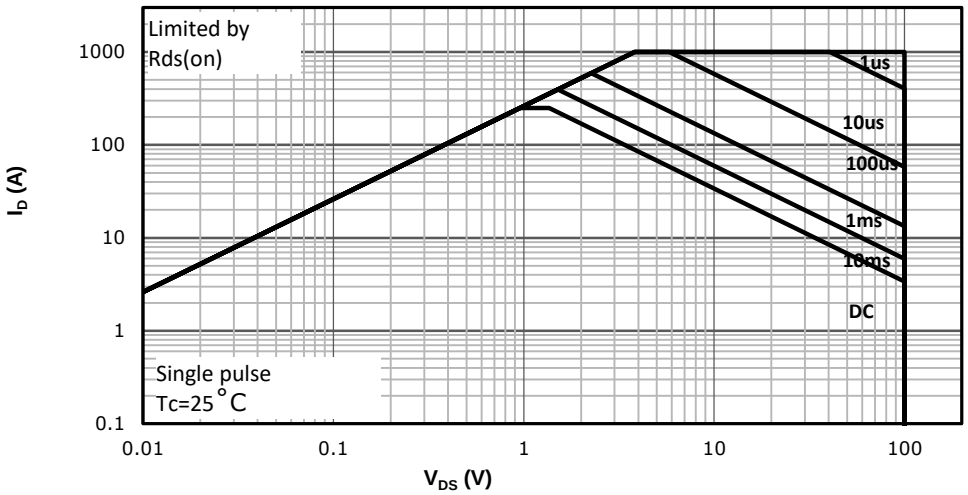
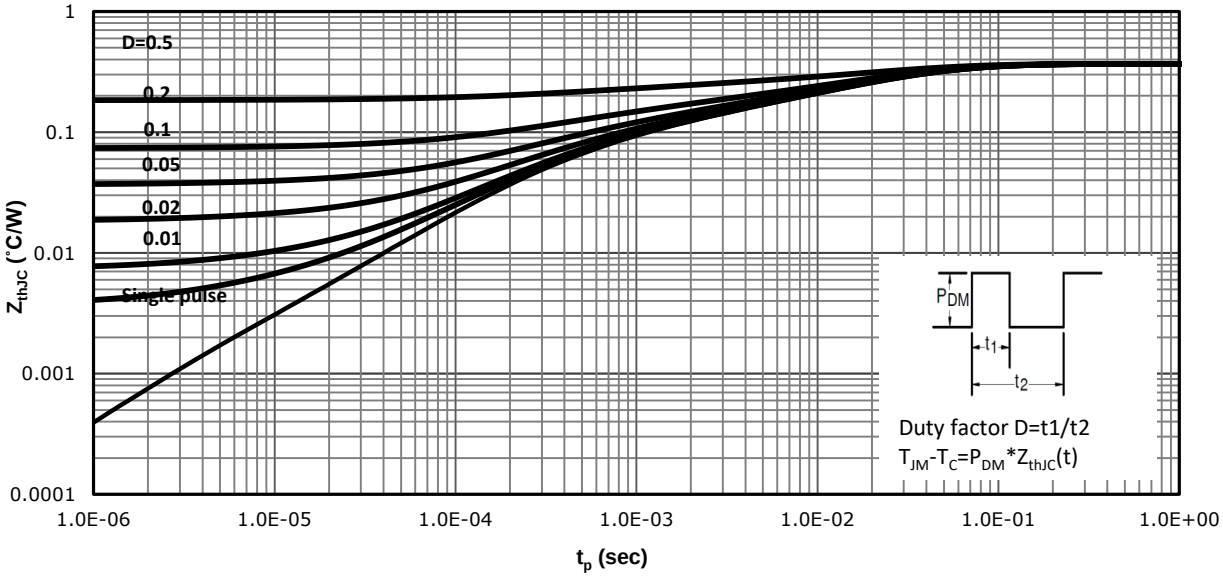


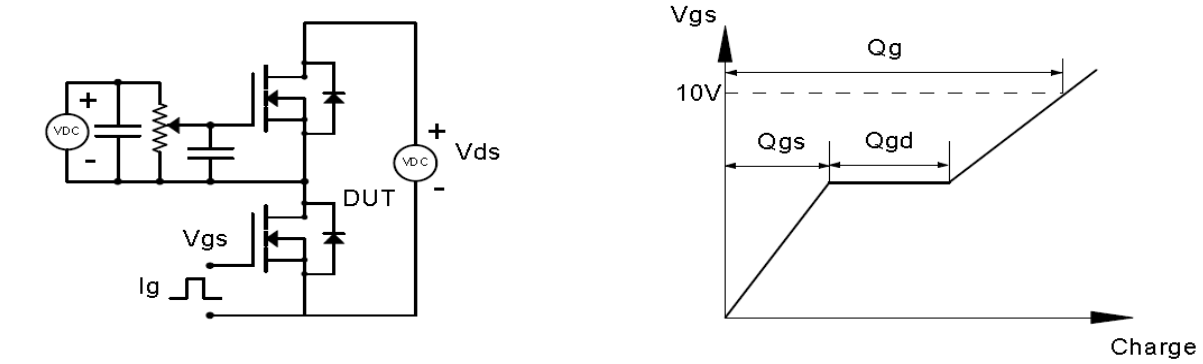
Fig 14: Max. Transient Thermal Impedance



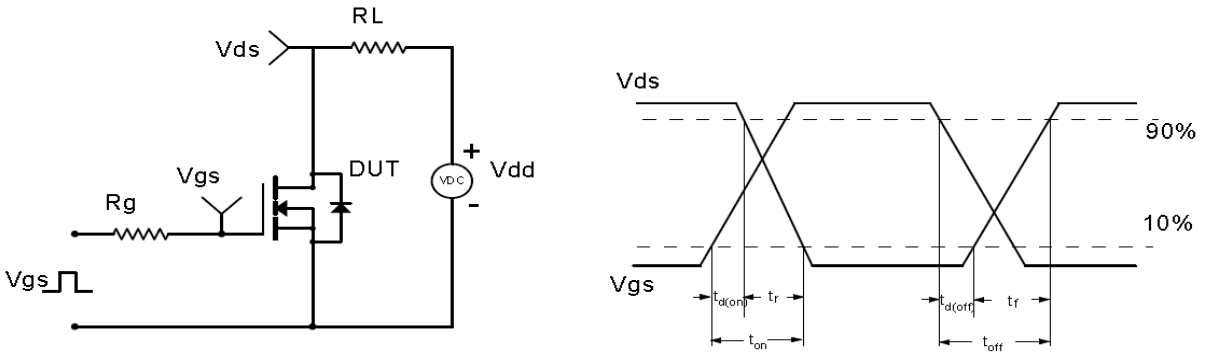
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Test Circuit & Waveform

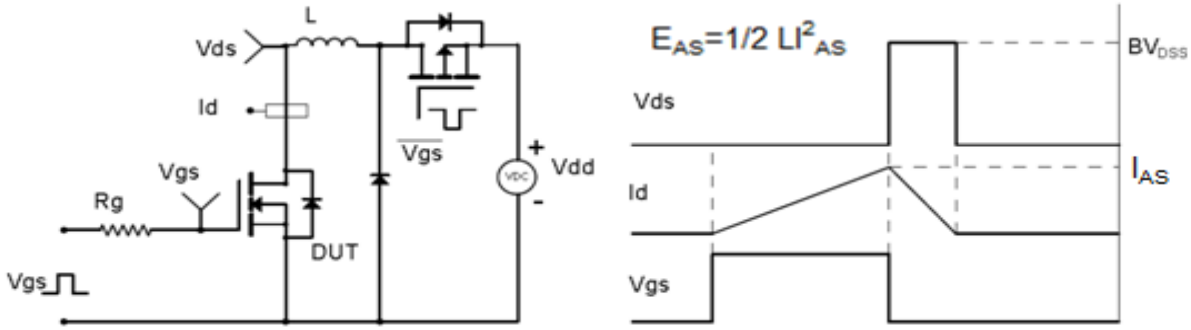
Gate Charge Test Circuit & Waveform



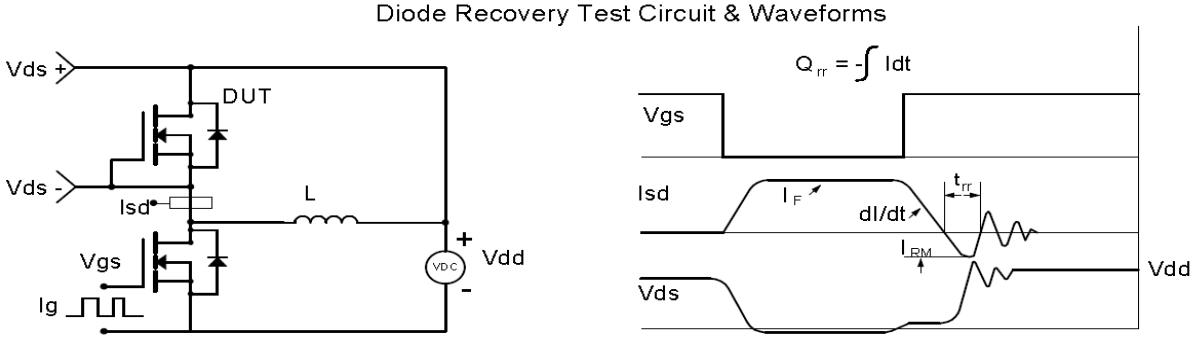
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

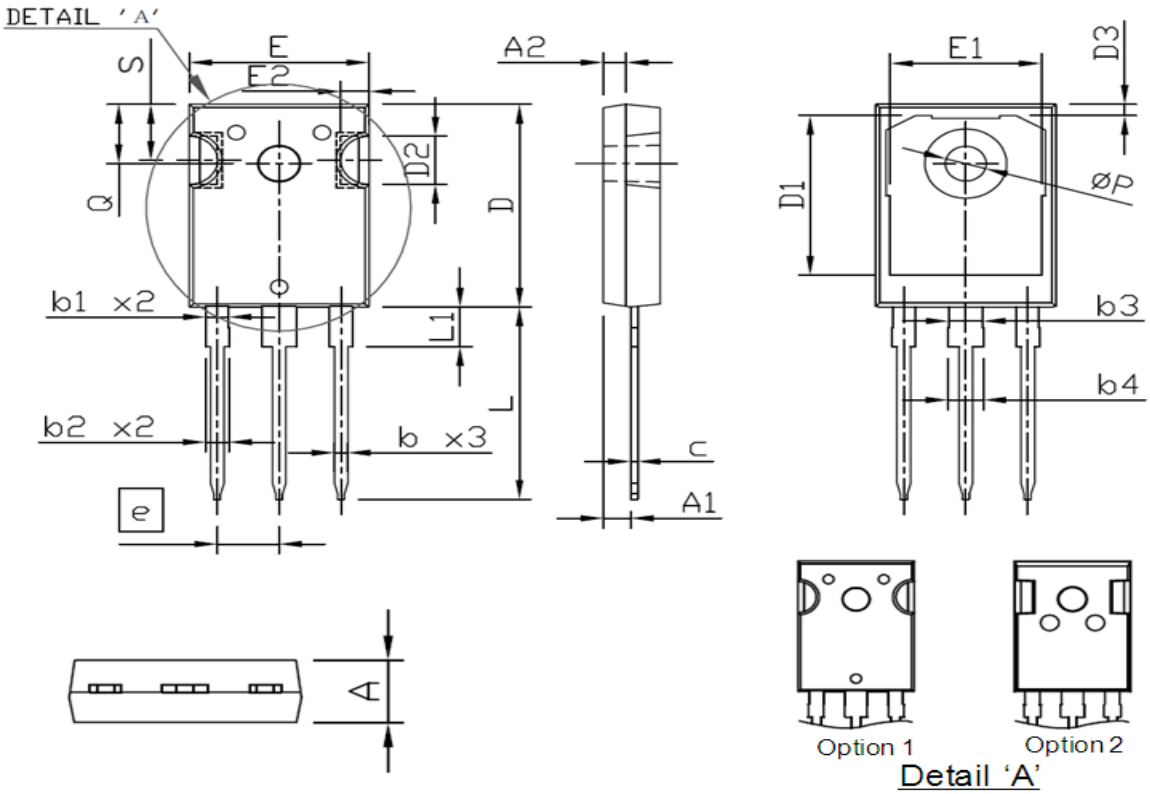


Diode Recovery Test Circuit & Waveforms



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Package Outline: TO-247



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
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

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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	2023/8/9	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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