华润微电子(重庆)有限公司

CRSQ113N20NZ

SkyMOS3 N-MOSFET 200V, 8.8mΩ, 110A

Features

- Uses CRM(CQ) advanced SkyMOS3 technology
- Extremely low on-resistance RDS(on)
- Excellent QgxRDS(on) product(FOM)
- Qualified according to JEDEC criteria

Applications

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

Product Summary

V_{DS}	200V
$R_{DS(on)}$	8.8mΩ
I_D	110A

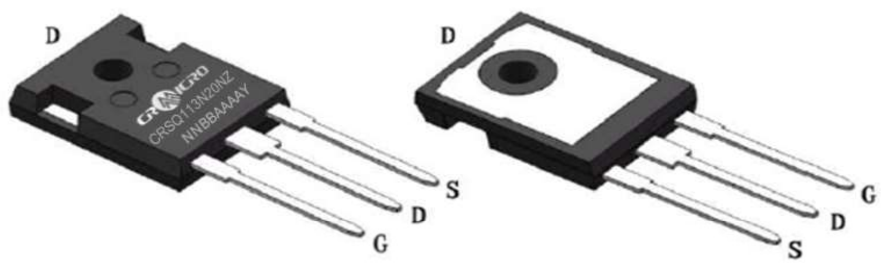
100% Avalanche Tested

100% DVDS Tested

RoHS

H F

TO-247



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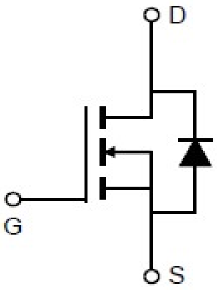


Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSQ113N20NZ	CRSQ113N20NZ	TO-247	Tube	N/A	N/A	25pcs

Absolute Maximum Ratings

Parameter	**Symbol**	**Value**	**Unit**
Drain-source voltage	V_{DS}	200	V
Continuous drain current	I_D		A
T_C = 25°C (Silicon limit)		110	
T_C = 25°C (Package limit)		180	
T_C = 100°C (Silicon limit)		71	
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	440	A
Avalanche energy, single pulse (L=0.5mH, Rg=25Ω)[1]	E_{AS}	324	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	329	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 = 36A, Vgs=10V.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	0.38	°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

Parameter	Symbol	min.	typ.	max.	Unit	Test Condition
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=150°C
Gate-source leakage current	I_{GSS}	-	±10	±100	nA	V_{GS}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	8.8	10.6	mΩ	V_{GS}=10V, I_D=60A
Transconductance	g_{fs}	-	103.5	-	S	V_{DS}=5V,I_D=60A

Dynamic Characteristic

Parameter	Symbol	min.	typ.	max.	Unit	Test Condition
Input Capacitance	C_{iss}	3512	5268	7902	pF	V_{GS}=0V, V_{DS}=100V, f=1MHz
Output Capacitance	C_{oss}	308	462	693		
Reverse Transfer Capacitance	C_{rss}	16	24	36		
Gate Total Charge	Q_G	49	74	111	nC	V_{GS}=10V, V_{DS}=100V, I_D=60A, f=1MHz
Gate-Source charge	Q_{gs}	20	30	45		
Gate-Drain charge	Q_{gd}	11	16	24		
Turn-on delay time	$t_{d(on)}$	23	35	53	ns	V_{GS}=10V, V_{DD}=100V, R_{G_ext}=2.7Ω
Rise time	t_r	74	111	167		
Turn-off delay time	$t_{d(off)}$	56	84	126		
Fall time	t_f	75	112	168		
Gate resistance	R_G	2	3.5	6	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}	-	0.89	1.3	V	V_{GS}=0V,I_{SD}=60A
Body Diode Reverse Recovery Time	t_{rr}	75.4	150.8	301.6	ns	I_F=60A, dI/dt=100A/us Vds=100V
Body Diode Reverse Recovery Charge	Q_{rr}	389.7	779.4	1558.8	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

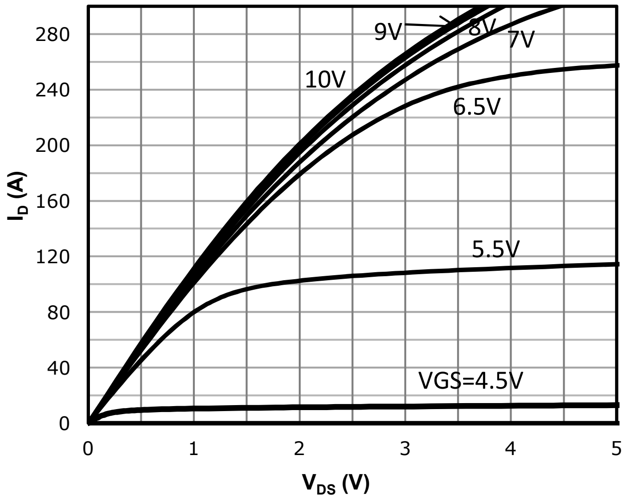


Fig 2: Transfer Characteristics

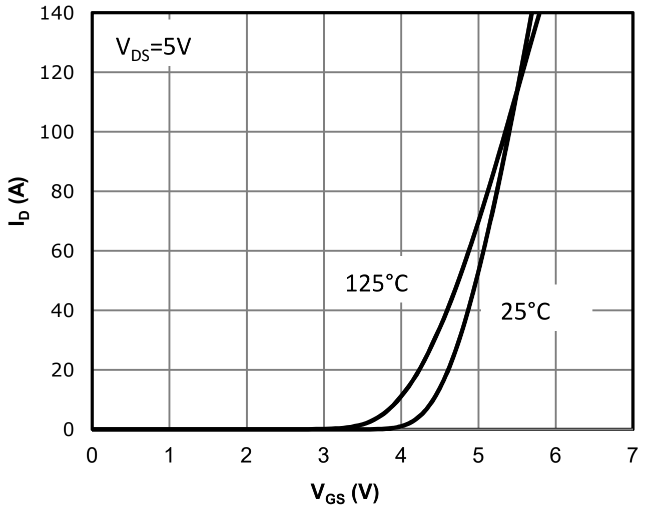


Fig 3: Rds(on) vs Drain Current and Gate Voltage

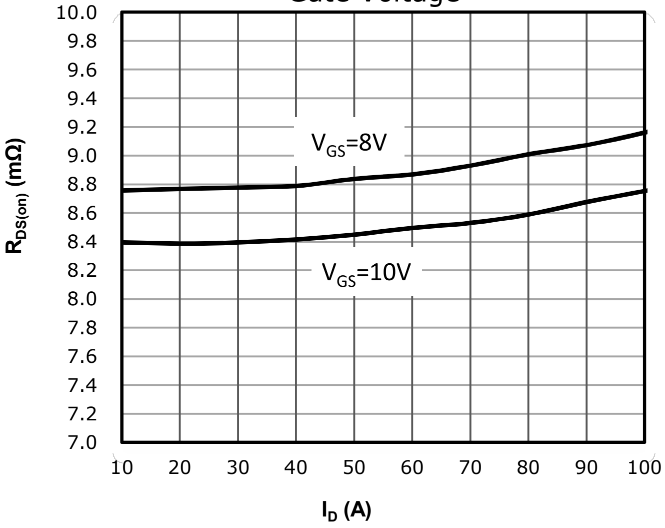


Fig 4: Rds(on) vs Gate Voltage

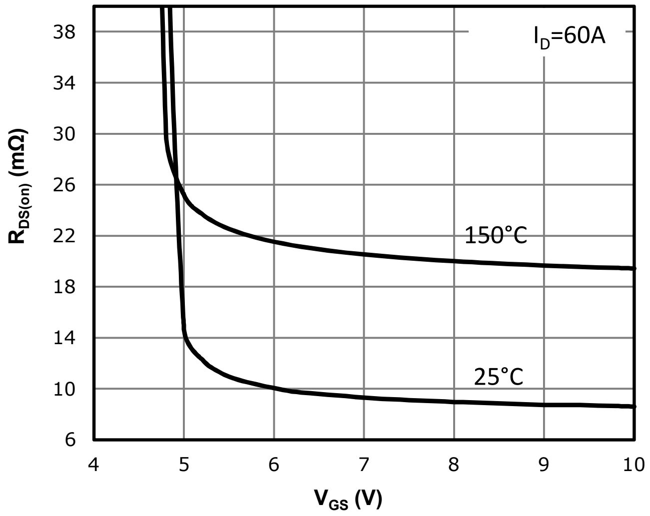


Fig 5: Rds(on) vs. Temperature

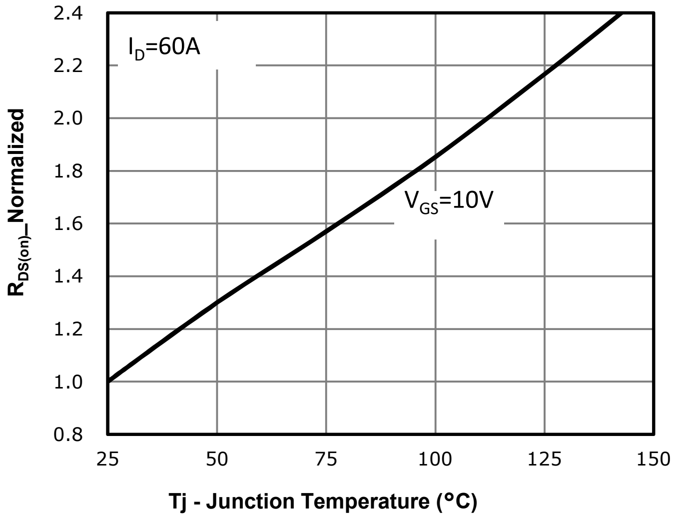


Fig 6: Capacitance Characteristics

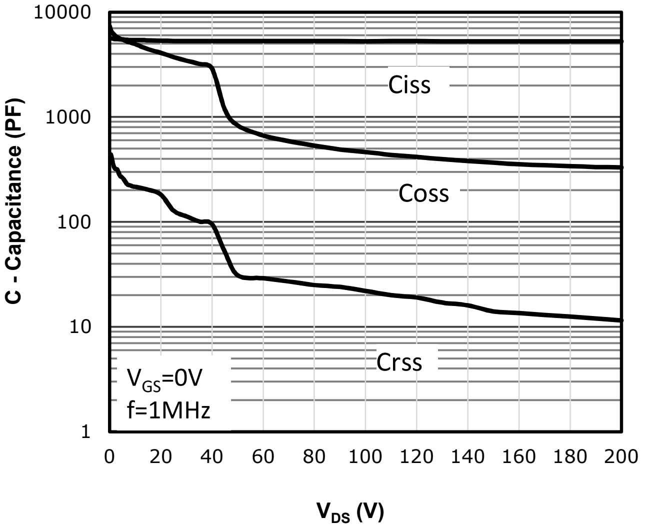


Fig 7: Gate Charge Characteristics

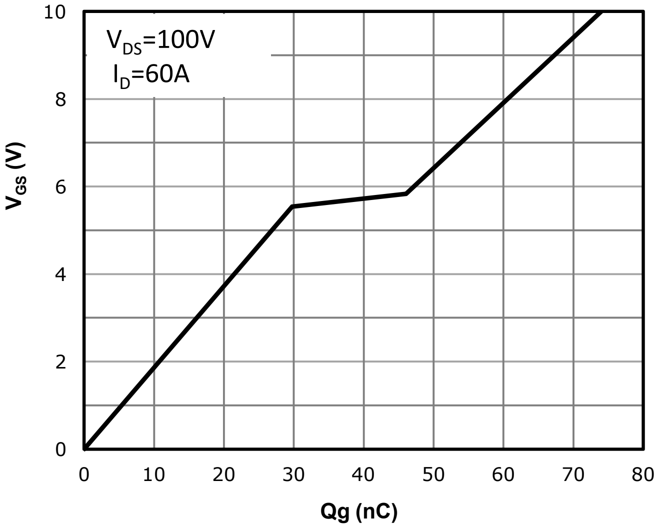


Fig 8: Body-diode Forward Characteristics

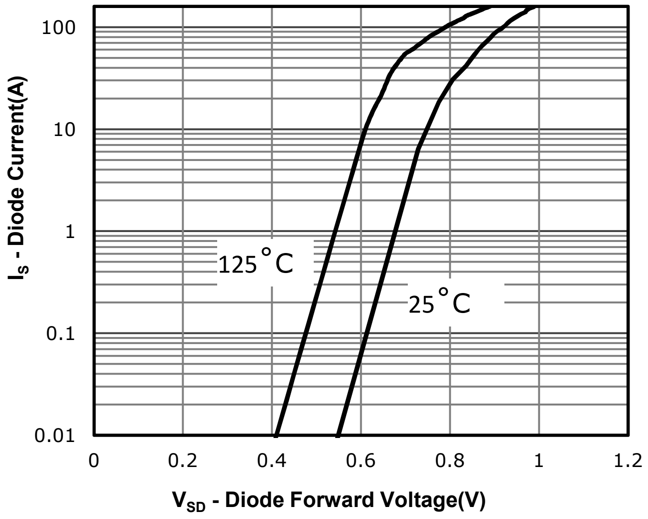


Fig 9: Power Dissipation

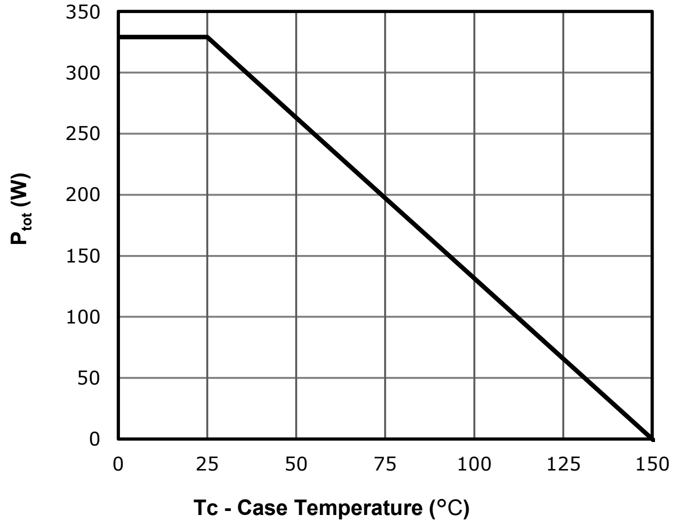


Fig 10: Drain Current Derating

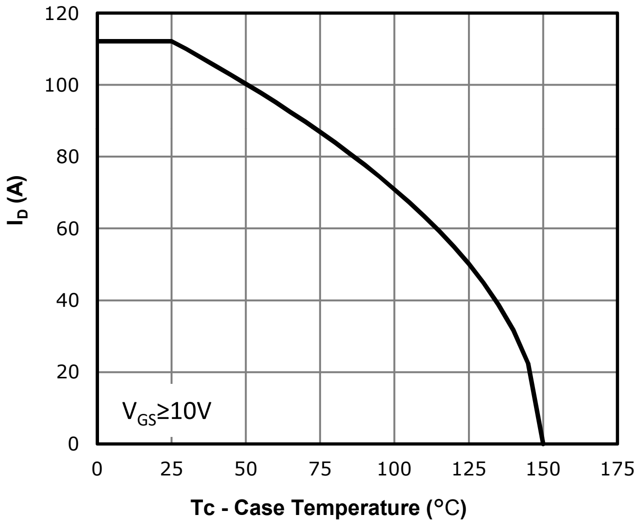


Fig 11: Safe Operating Area

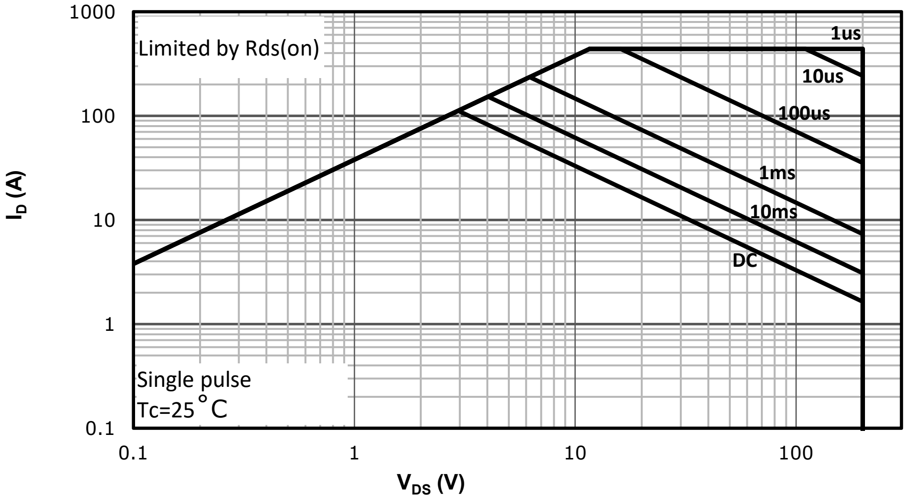
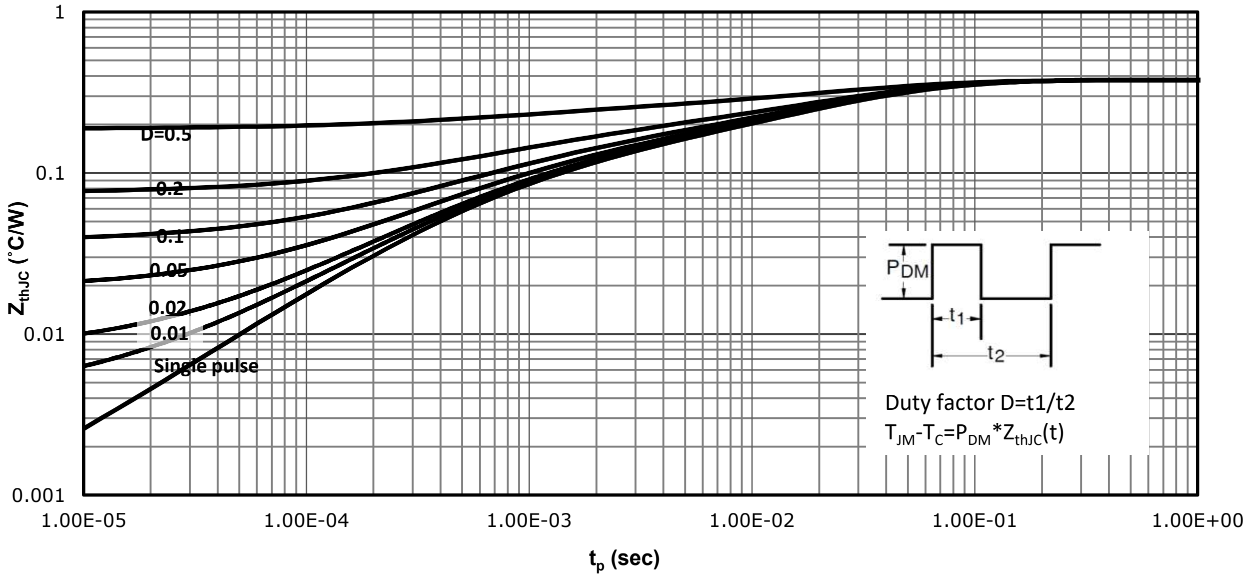
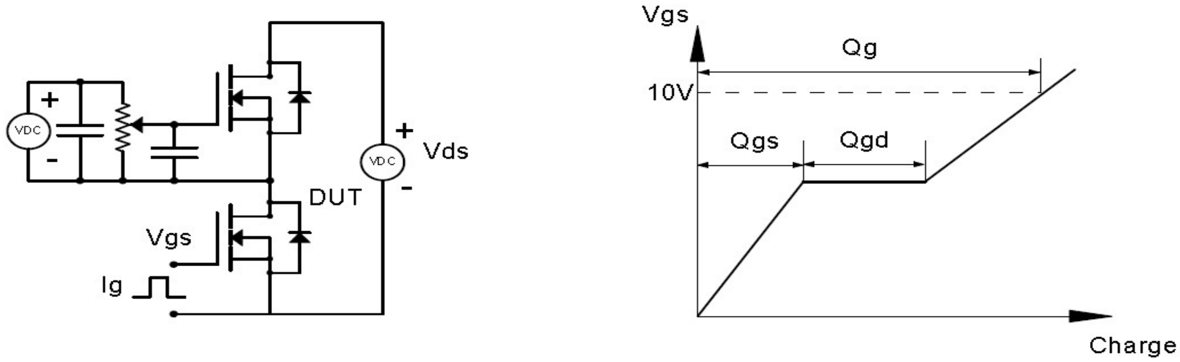


Fig 12: Max. Transient Thermal Impedance

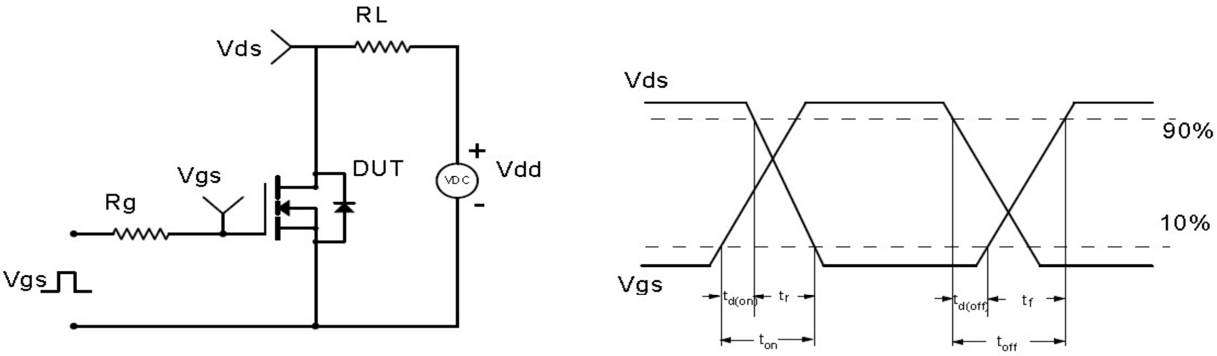


Test Circuit & Waveform

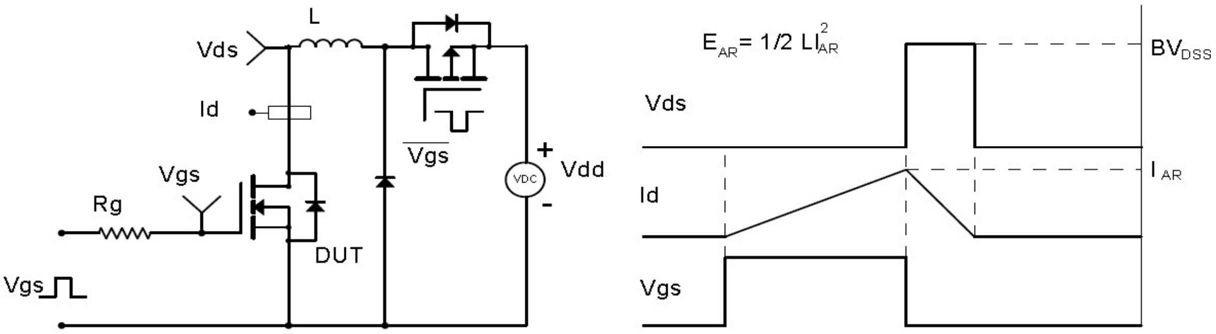
Gate Charge Test Circuit & Waveform



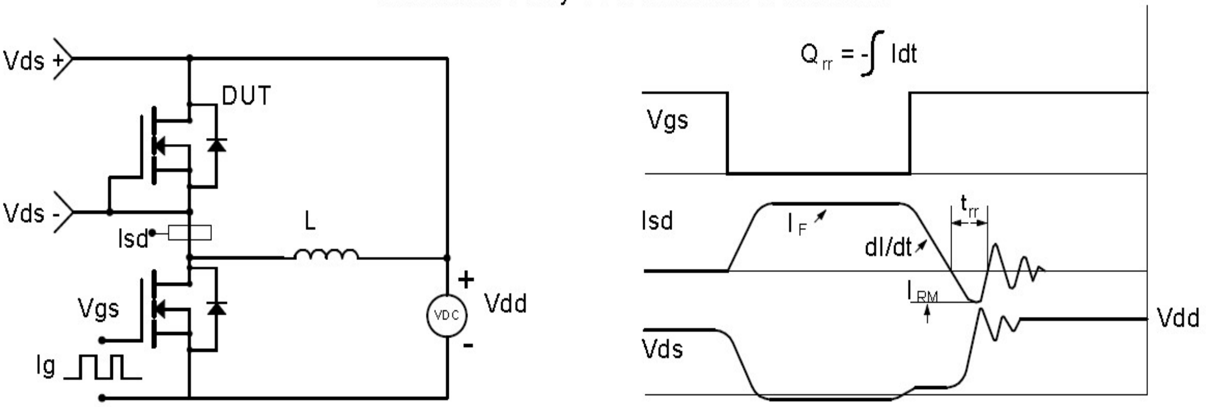
Resistive Switching Test Circuit & Waveforms



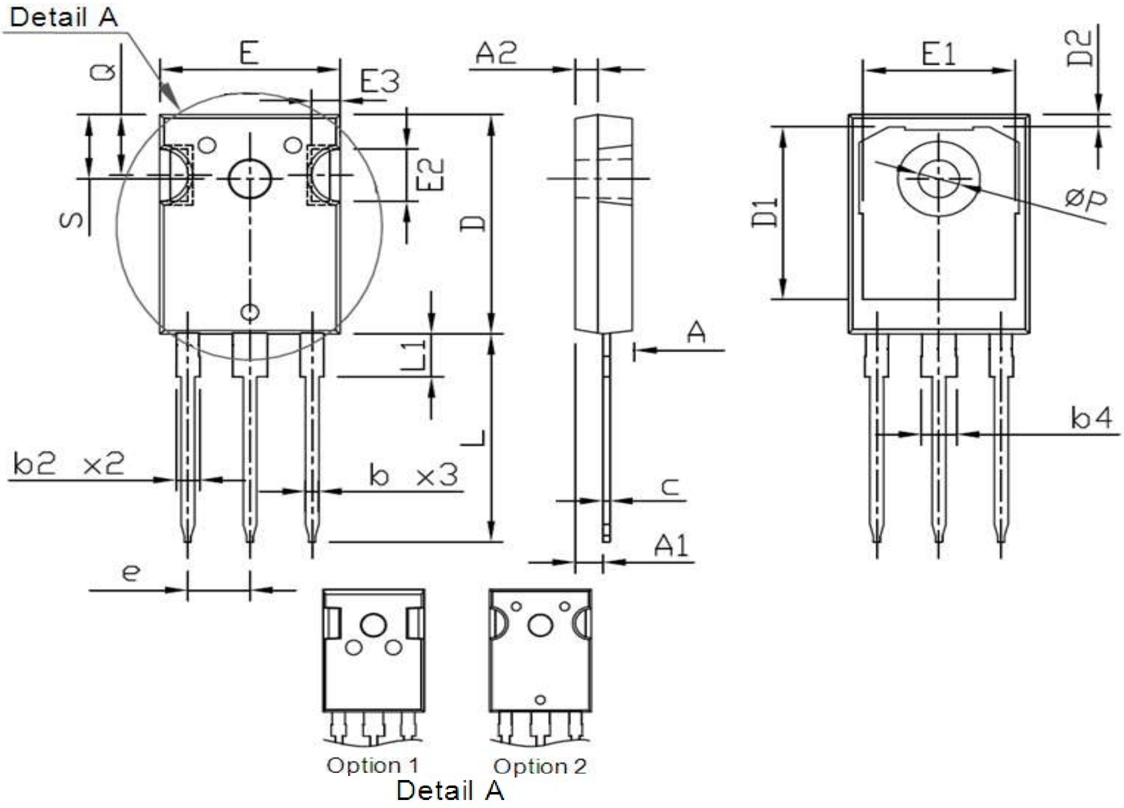
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: TO-247



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	**Max.**	**Min.**	**Max.**
A	4.70	5.30	0.185	0.209
A1	2.20	2.60	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	1.04	1.33	0.041	0.052
b2	1.90	2.41	0.075	0.095
b4	2.87	3.43	0.113	0.135
c	0.55	0.70	0.022	0.028
D	20.70	21.30	0.815	0.839
D1	16.25	17.65	0.640	0.695
D2	0.51	1.40	0.020	0.055
e	5.44 BSC.		0.214 BSC.	
E	15.50	16.30	0.610	0.642
E1	13.08	14.16	0.515	0.557
E2	3.80	5.49	0.150	0.216
E3	1.00	2.75	0.039	0.108
L	19.72	20.32	0.776	0.800
L1	3.85	4.50	0.152	0.177
Q	5.25	6.25	0.207	0.246
P	3.50	3.70	0.138	0.146
S	6.04	6.30	0.238	0.248

Revision History

Revison	Date	Major changes
1.0	2022/10/31	Release of Prelimnary version.

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.