华润微电子(重庆)有限公司

CRSQ113N20NZ-Q

SkyMOS3 N-MOSFET 200V, 8.8mΩ, 115A

Features

- Uses CRM(CQ) advanced SkyMOS3 technology
- Extremely low on-resistance RDS(on)
- Excellent QgxRDS(on) product(FOM)
- AEC-Q101 Criteria Qualified
- 175°C Operating Temperature

Product Summary

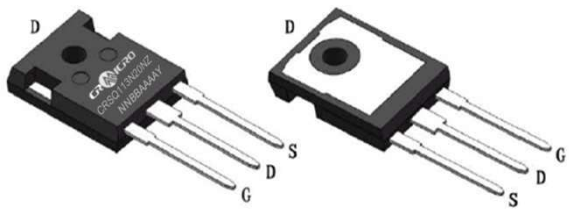
V_{DS}	200V
$R_{DS(on)}$	8.8mΩ
I_D	115A

100% Avalanche Tested
100% DVDS Tested

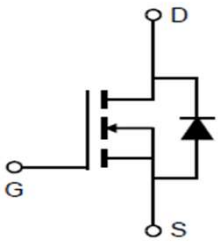
Applications

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

TO-247



CRSQ113N20NZ-Q



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSQ113N20NZ-Q	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 T_C = 25°C (Silicon limit) T_C = 25°C (Package limit) T_C = 100°C (Silicon limit)	I_D	 115 160 81	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	460	A
Avalanche energy, single pulse (L = 0.5mH, Rg=25Ω)	E_{AS}	324	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	357	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+175	°C

※. Notes:1.EAS is tested at starting Tj = 25℃, L = 0.5mH, IAS = 36A, Vgs=10V.

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Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	0.42	°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}	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	$R_{DS(on)}$	-	8.8	10.6	mΩ	V_{GS}=10V, I_D=60A
Transconductance	g_{fs}	-	103.5	-	S	V_{DS}=5V,I_D=60A
Dynamic Characteristic						
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	2.0	3.5	6.0	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}	-	0.89	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	

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Typical Performance Characteristics

Fig 1: Output Characteristics

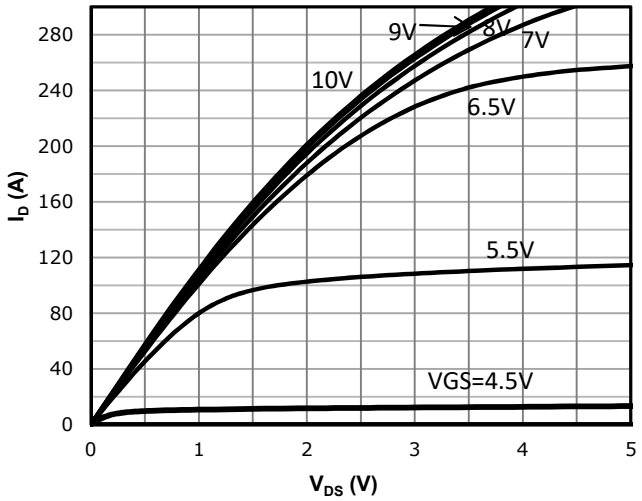


Fig 2: Transfer Characteristics

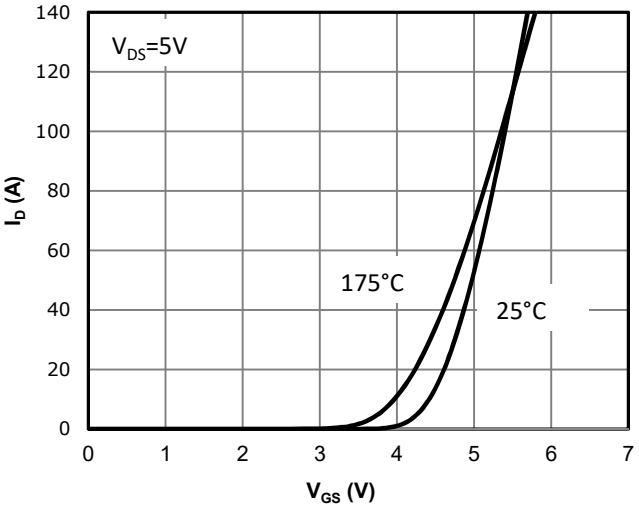


Fig 3: Rds(on) vs Drain Current and Gate Voltage

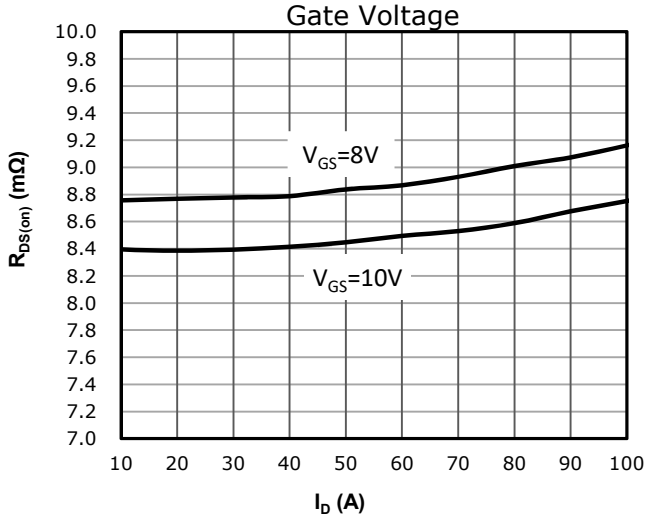


Fig 4: Rds(on) vs Gate Voltage

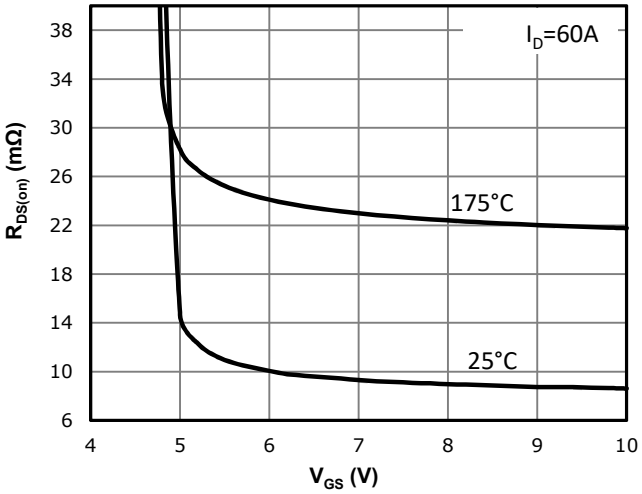


Fig 5: Rds(on) vs. Temperature

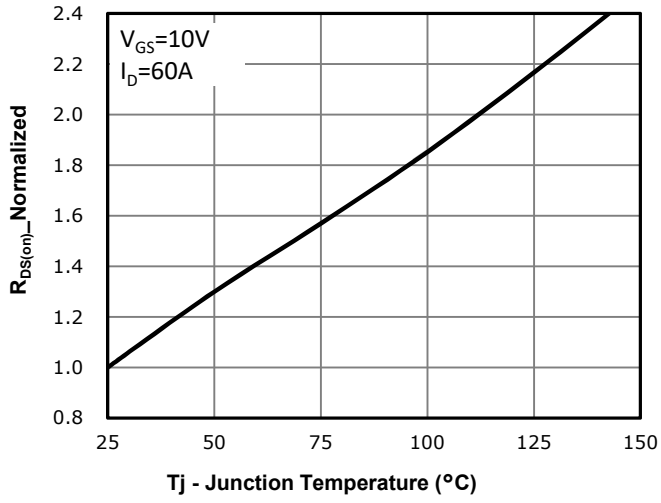
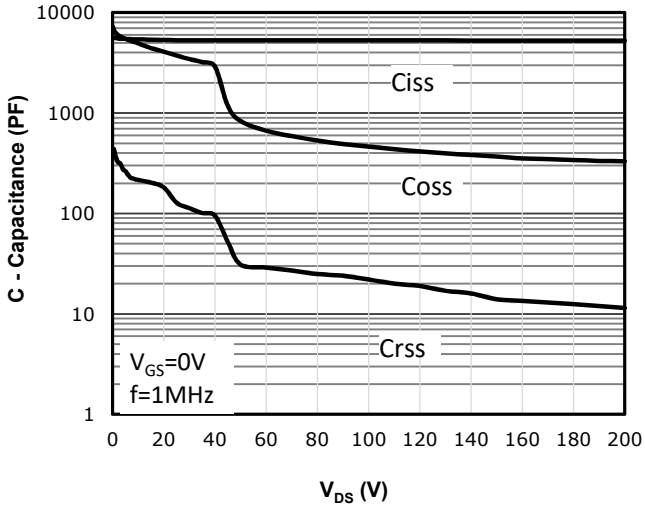


Fig 6: Capacitance Characteristics



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Fig 7: Vgs(th) vs. Temperature

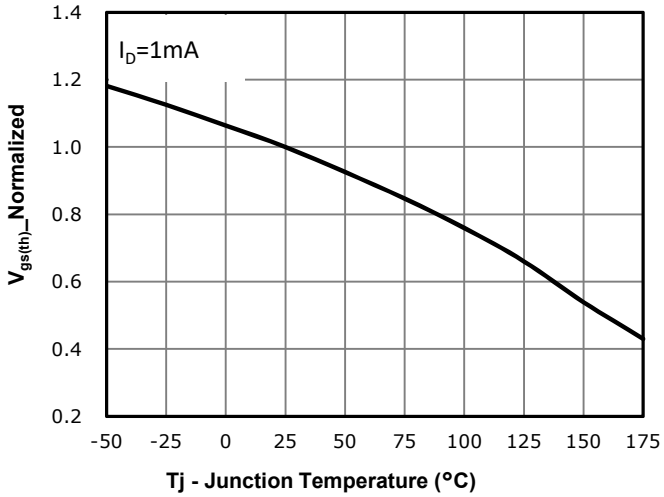


Fig 8: BVdss vs. Temperature

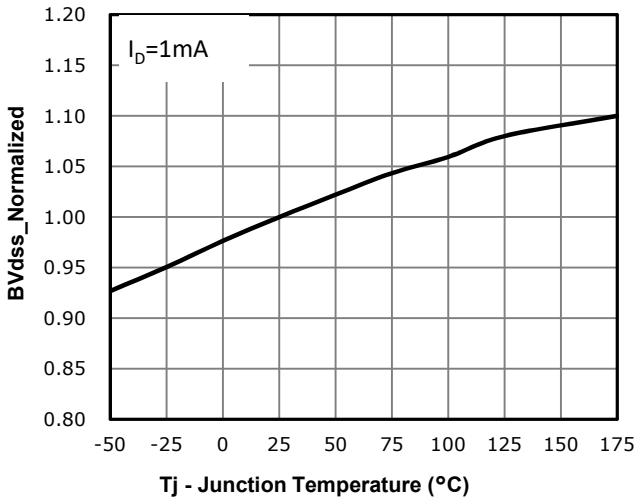


Fig 9: Gate Charge Characteristics

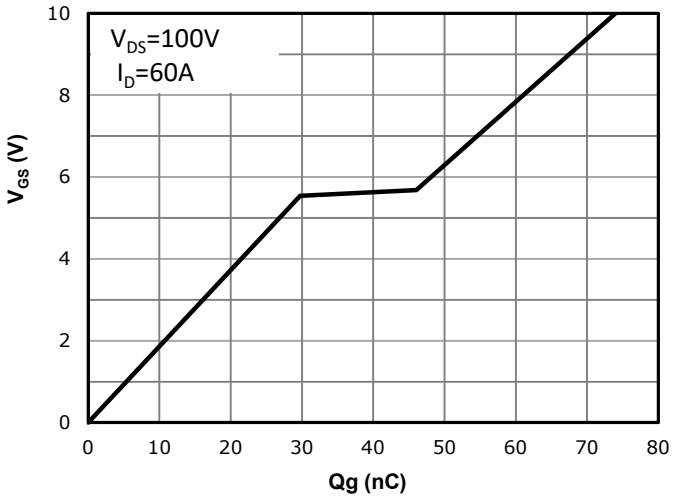


Fig 10: Body-diode Forward Characteristics

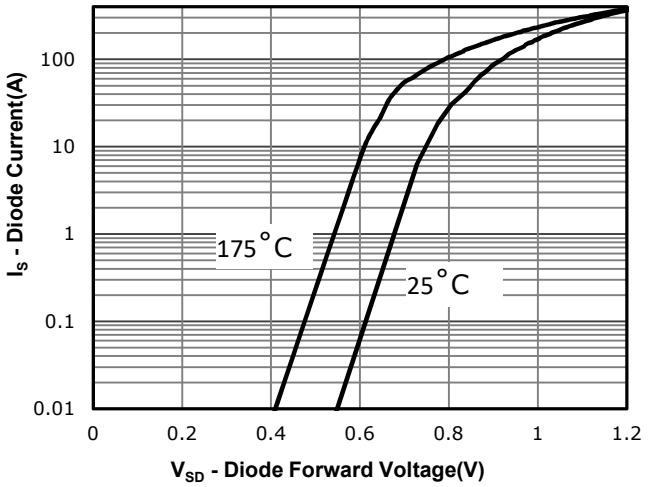


Fig 11: Power Dissipation

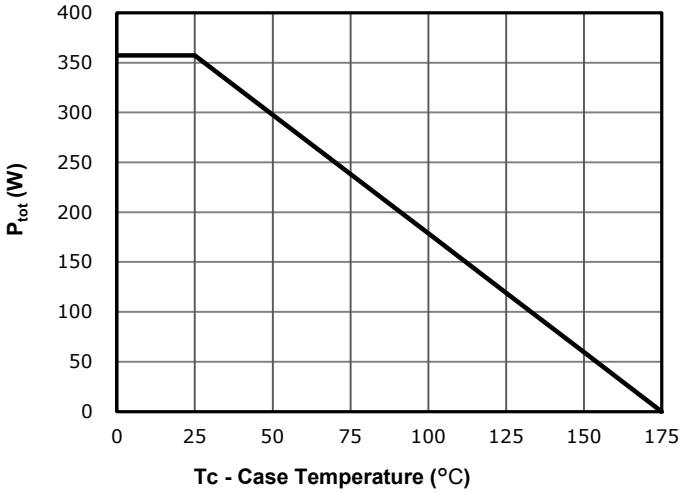
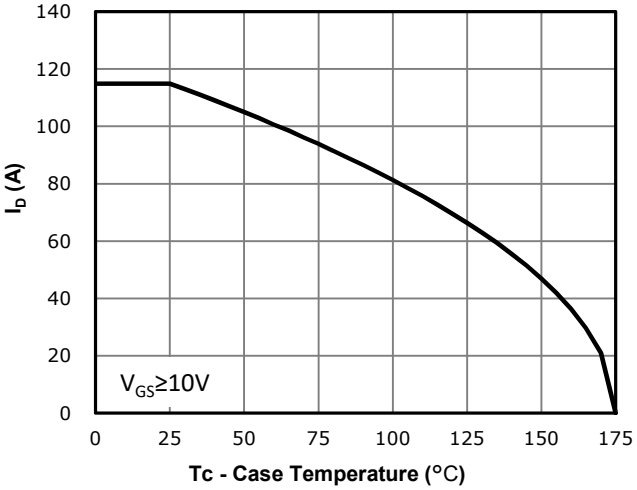


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

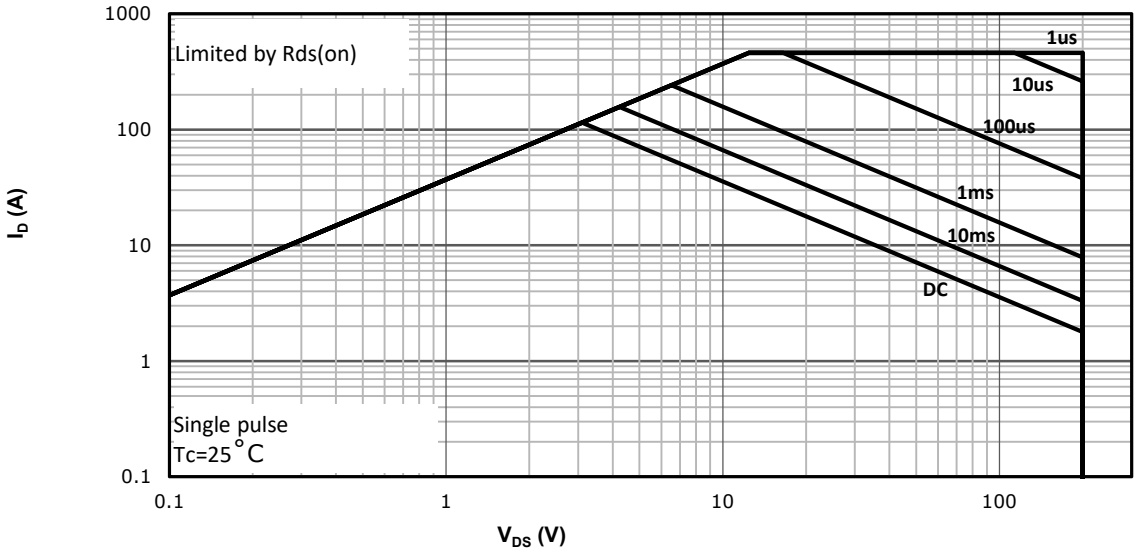
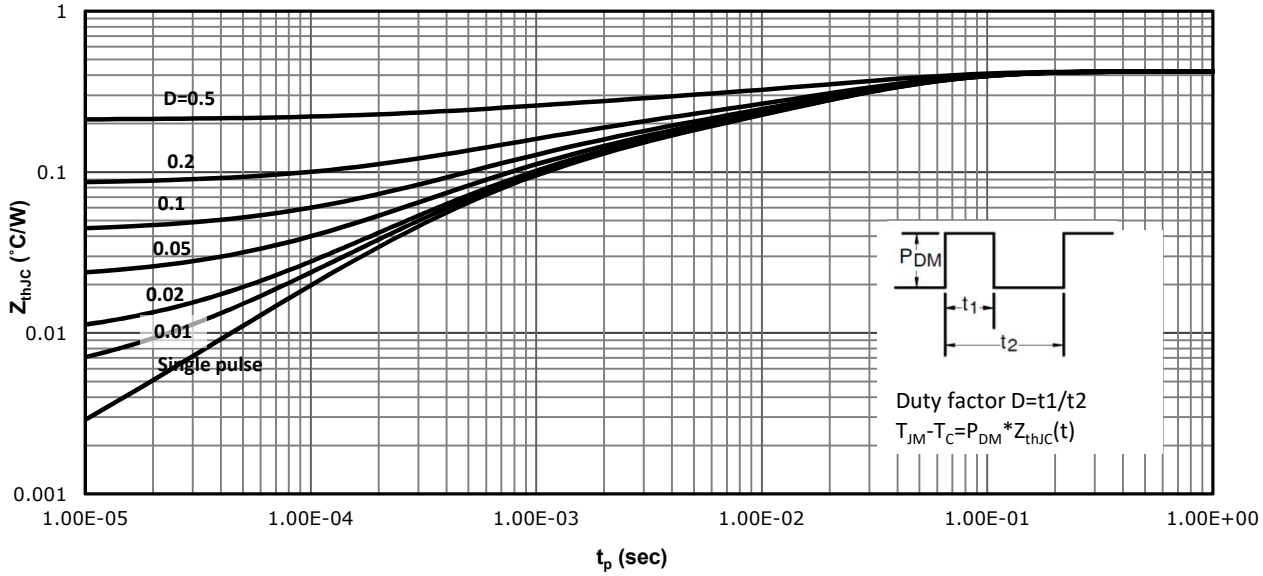


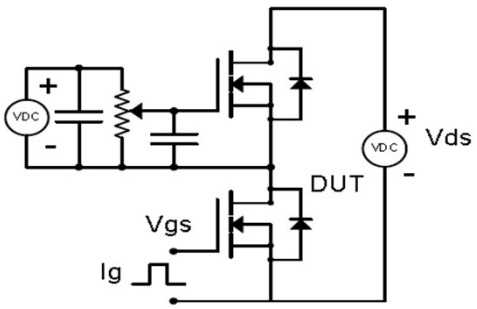
Fig 14: Max. Transient Thermal Impedance

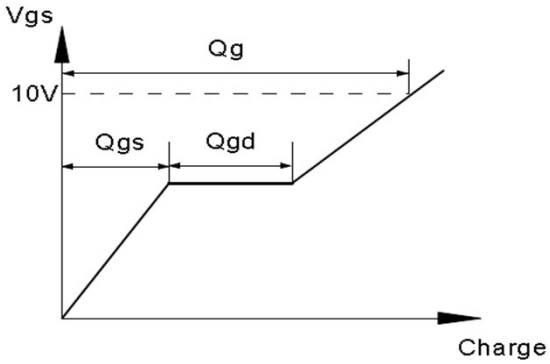


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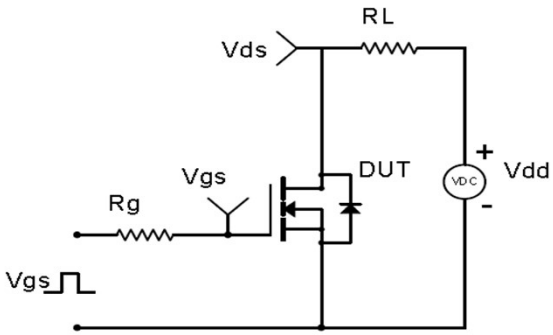
Test Circuit & Waveform

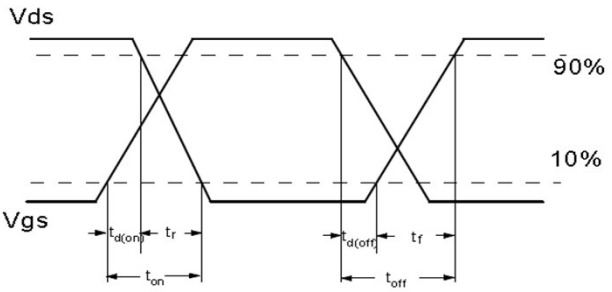
Gate Charge Test Circuit & Waveform



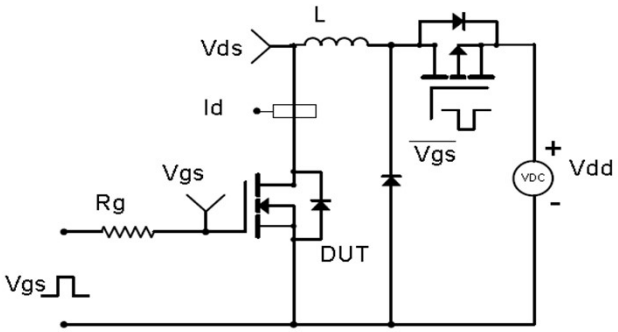


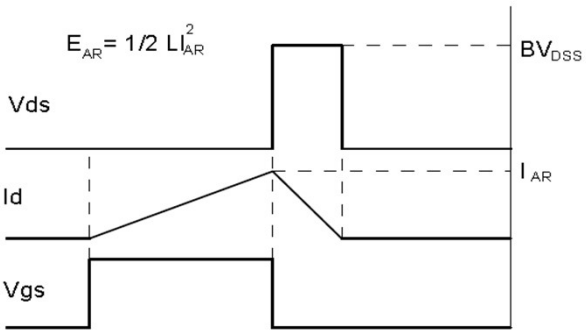
Resistive Switching Test Circuit & Waveforms



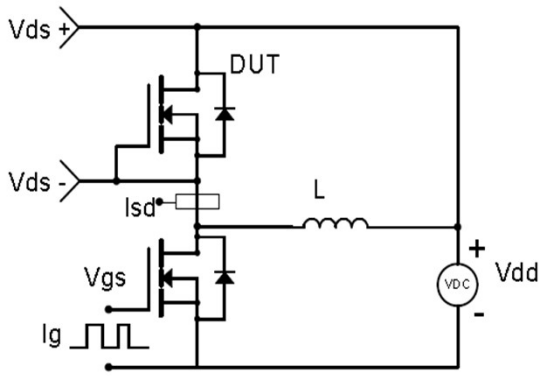


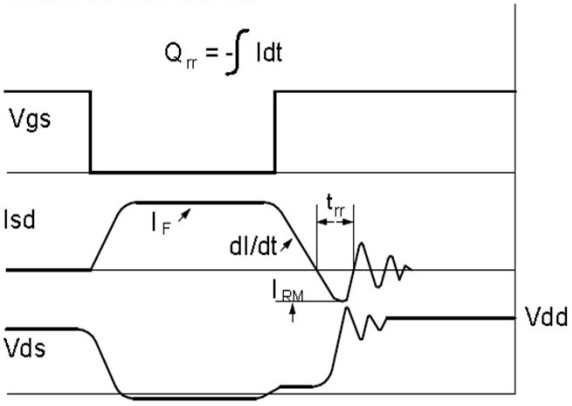
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





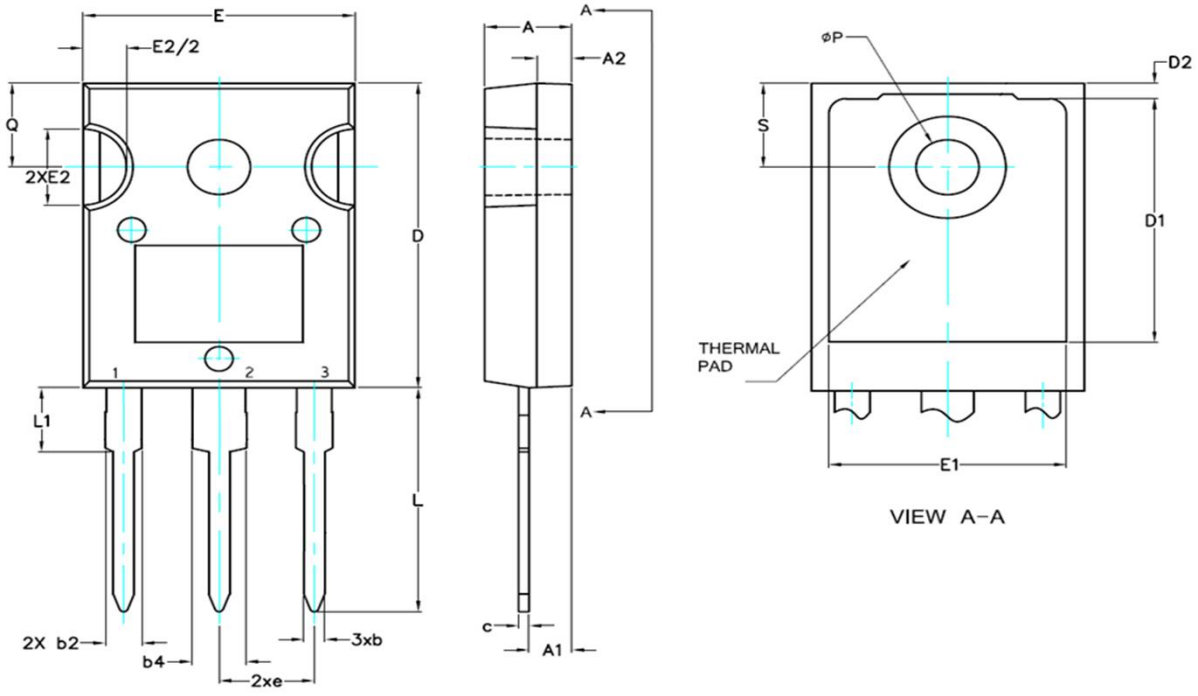
Diode Recovery Test Circuit & Waveforms





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Package Outline: TO-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	0.99	1.40	0.039	0.055
b2	1.65	2.41	0.065	0.095
b4	2.59	3.43	0.102	0.135
c	0.38	0.89	0.015	0.035
D	19.70	20.70	0.776	0.815
D1	13.08	--	0.515	--
D2	0.51	1.40	0.020	0.055
e	5.45 BSC		0.215 BSC	
E	15.29	16.00	0.602	0.630
E1	13.40	--	0.528	--
E2	4.50	5.49	0.177	0.216
L	14.20	16.10	0.559	0.634
L1	3.70	4.50	0.146	0.177
Q	5.25	6.25	0.207	0.246
P	3.50	3.70	0.138	0.146
S	5.51 BSC		0.217 BSC	

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Revision History

Revison	Date	Major changes
1.0	2023/5/15	Release of Prelimnary version.

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