CRTQ150N20NZ

Trench N-MOSFET 200V, 13.3mΩ, 92A

Features

- Uses CRM(CQ) advanced Trench MOS technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g x R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria

Applications

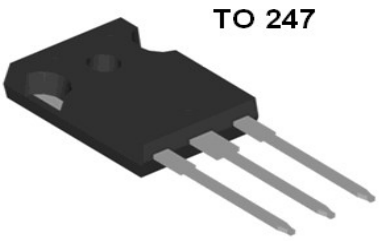
- Motor control and drive
- Battery management
- UPS (Uninterrupible Power Supplies)

Product Summary

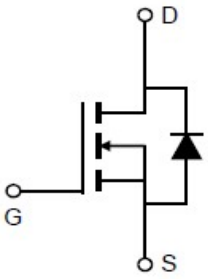
V_{DS}	200V
$R_{DS(on)}$	13.3mΩ
I_D	92A

100% Avalanche Tested
100% DVDS Tested

RoHS HF



CRTQ150N20NZ



Package Marking and Ordering Information

MARKING	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRTQ150N20NZ	CRTQ150N20NZ	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	 92 160 58	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	368	A
Avalanche energy, single pulse (L=1mH, Rg=25Ω)	E_{AS}	241	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	313	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	0.40	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	40	

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	$V_{GS(th)}$	3	4	5	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}	-	-	±100	nA	V_{GS}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	13.3	16	mΩ	V_{GS}=10V, I_D=30A
Transconductance	g_{fs}	-	90	-	S	V_{DS}=5V,I_D=30A
Dynamic Characteristic						
Input Capacitance	C_{iss}	3540	7080	14160	pF	V_{GS}=0V, V_{DS}=100V, f=1MHz
Output Capacitance	C_{oss}	210	420	840		
Reverse Transfer Capacitance	C_{rss}	39	77	154		
Gate Total Charge	Q_G	-	123	-	nC	V_{GS}=10V, V_{DS}=100V, I_D=30A, f=1MHz
Gate-Source charge	Q_{gs}	-	52	-		
Gate-Drain charge	Q_{gd}	-	35	-		
Turn-on delay time	$t_{d(on)}$	-	47	-	ns	V_{GS}=10V, V_{DD}=100V, R_{G_ext}=3Ω
Rise time	t_r	-	91	-		
Turn-off delay time	$t_{d(off)}$	-	100	-		
Fall time	t_f	-	70	-		
Gate resistance	R_G	0.2	5	10	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}	-	0.8	1.3	V	V_{GS}=0V,I_{SD}=30A
Body Diode Continuous Forward Current	I_S			92	A	T_C = 25°C
Body Diode Reverse Recovery Time	t_{rr}	-	129	-	ns	I_F=30A, dI/dt=100A/us
Body Diode Reverse Recovery Charge	Q_{rr}	-	830	-	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

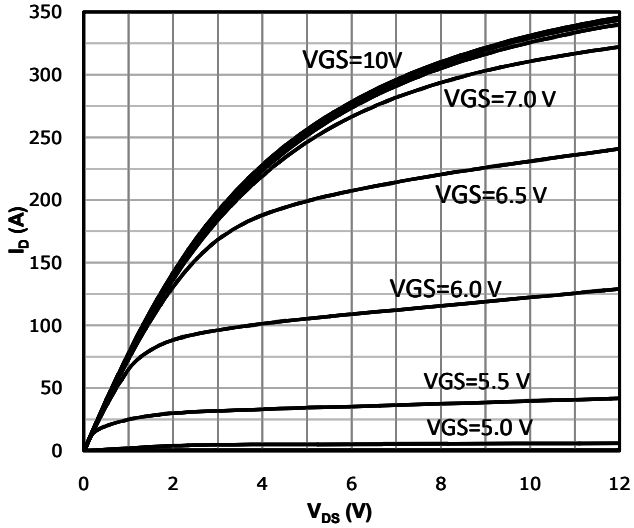


Fig 2: Transfer Characteristics

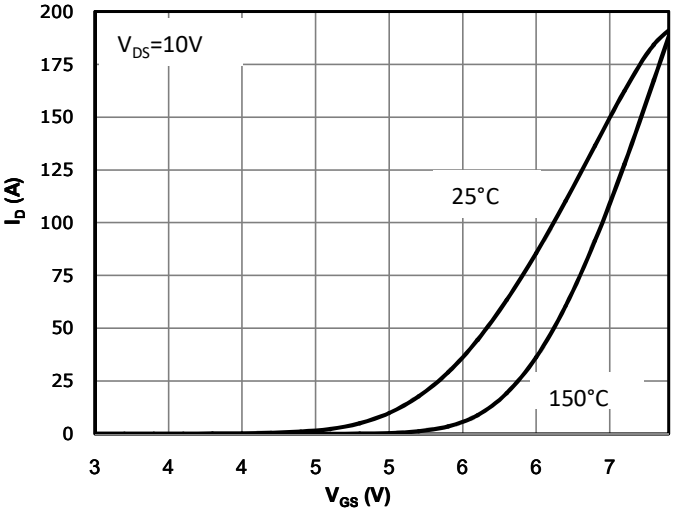


Fig 3: Rds(on) vs Drain Current and Gate Voltage

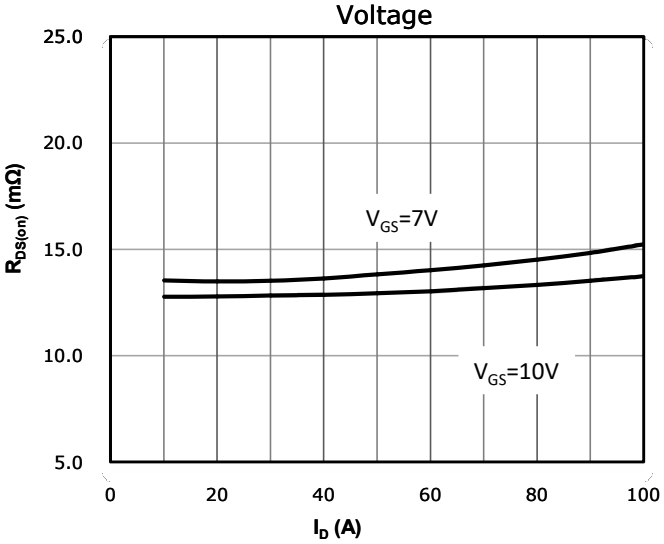


Fig 4: Rds(on) vs Gate Voltage

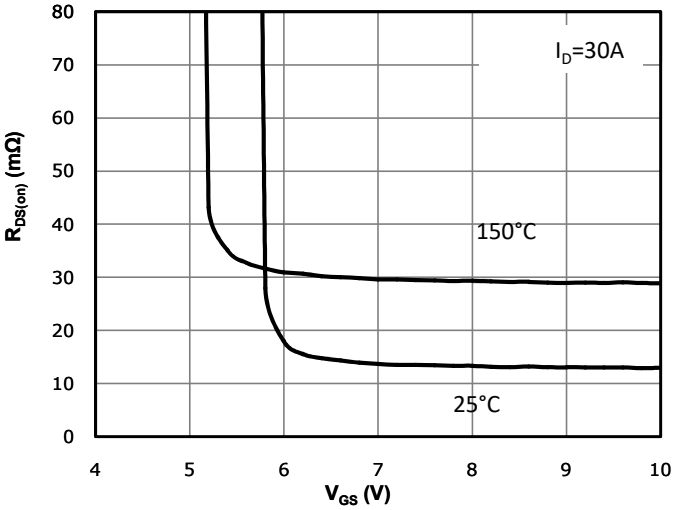


Fig 5: Vgs（th） vs. Temperature

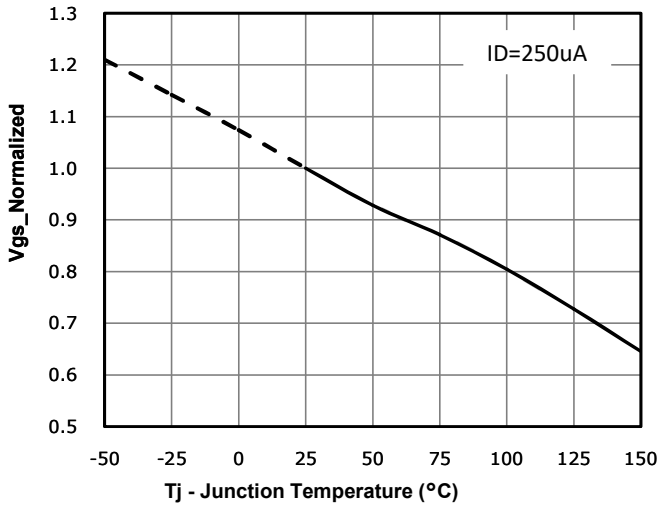


Fig 6: BVDSS vs. Temperature

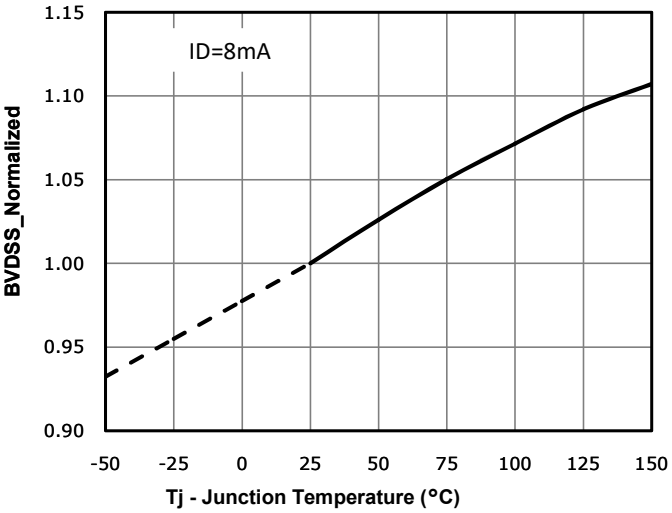


Fig 7: Rds(on) vs. Temperature

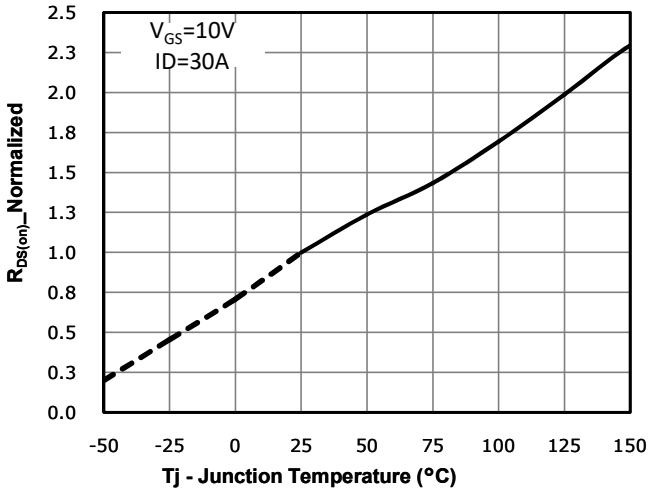


Fig 8: Capacitance Characteristics

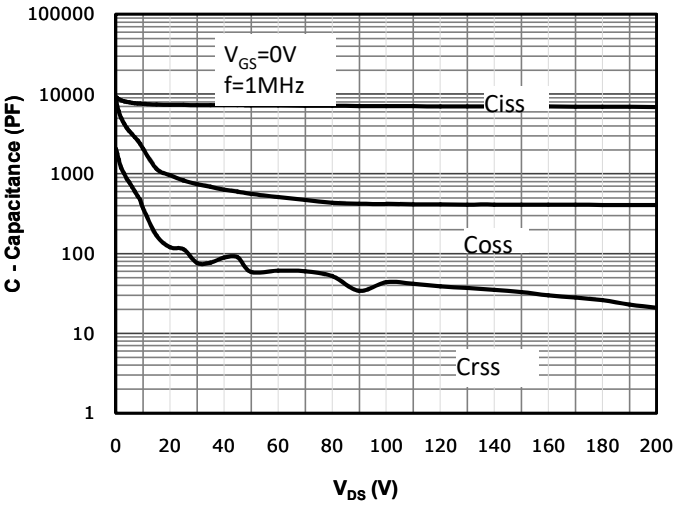


Fig 9: Gate Charge Characteristics

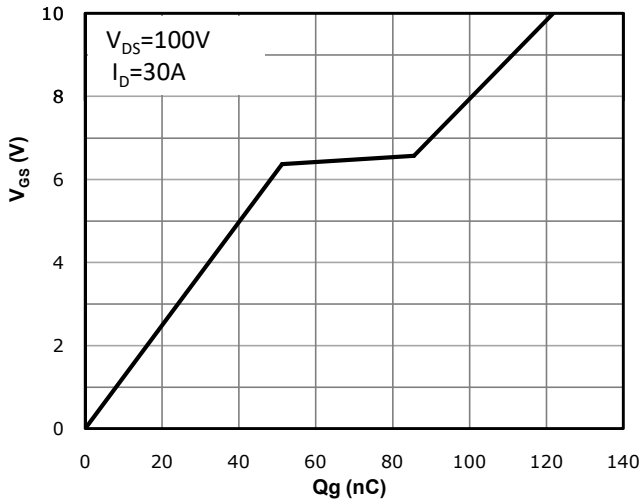


Fig 10: Body-diode Forward Characteristics

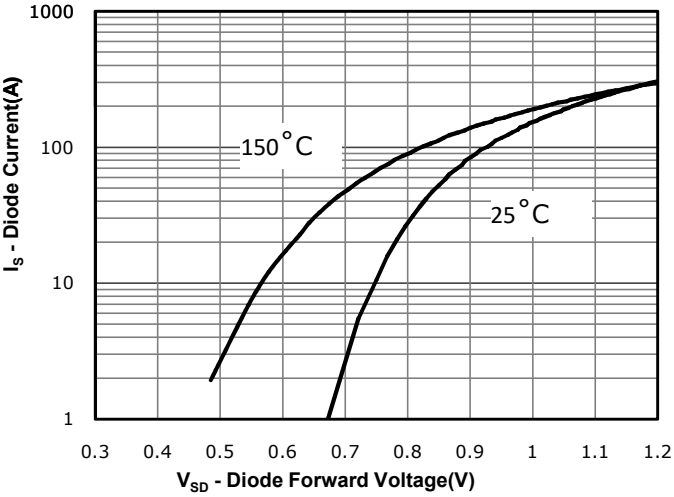


Fig 11: Power Dissipation

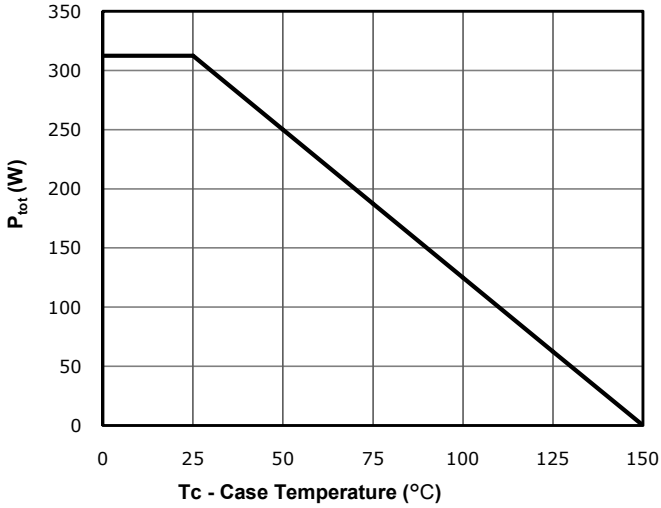


Fig 12: Drain Current Derating

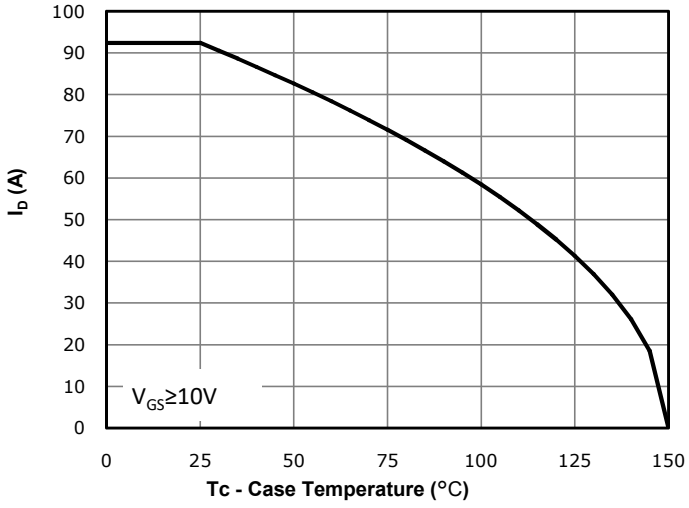


Fig 13: Safe Operating Area

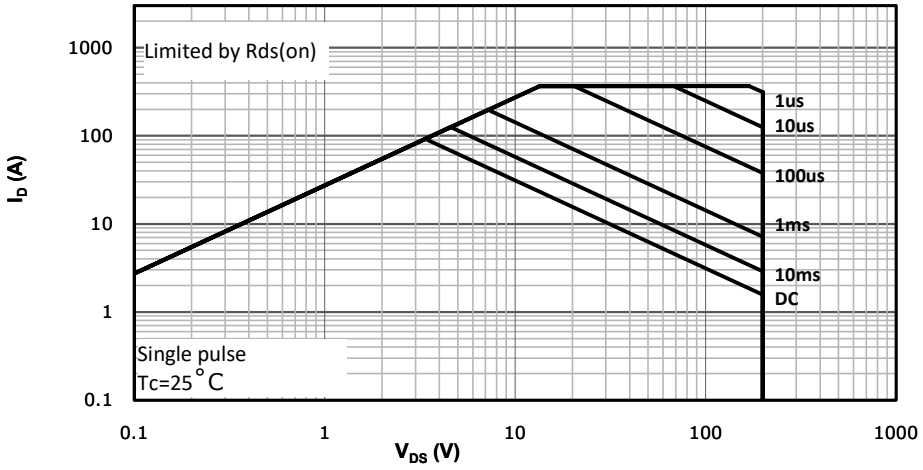
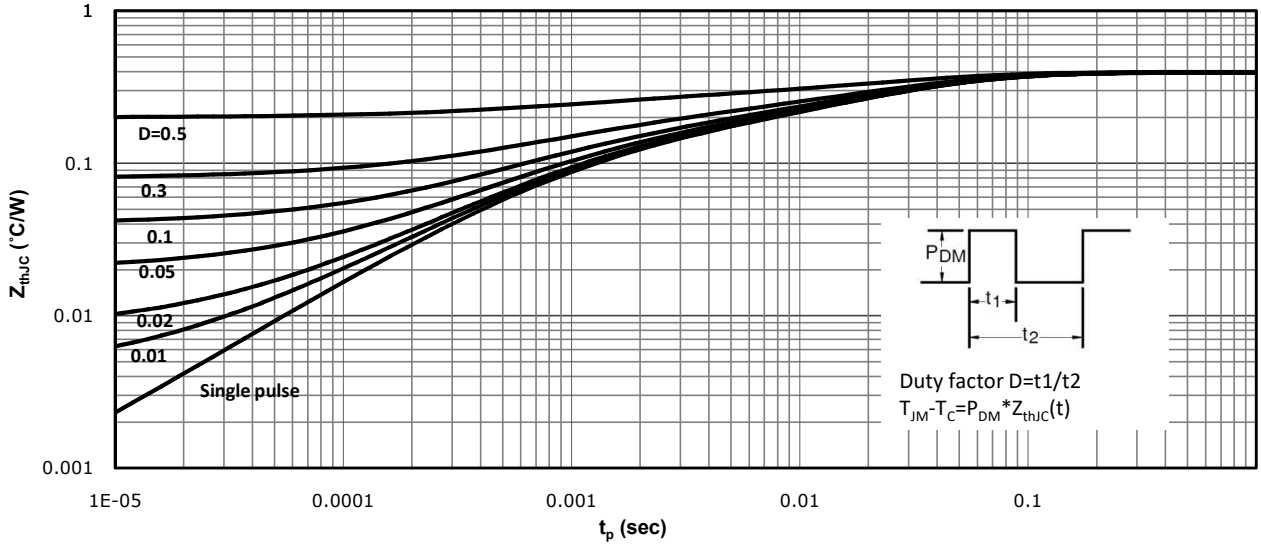
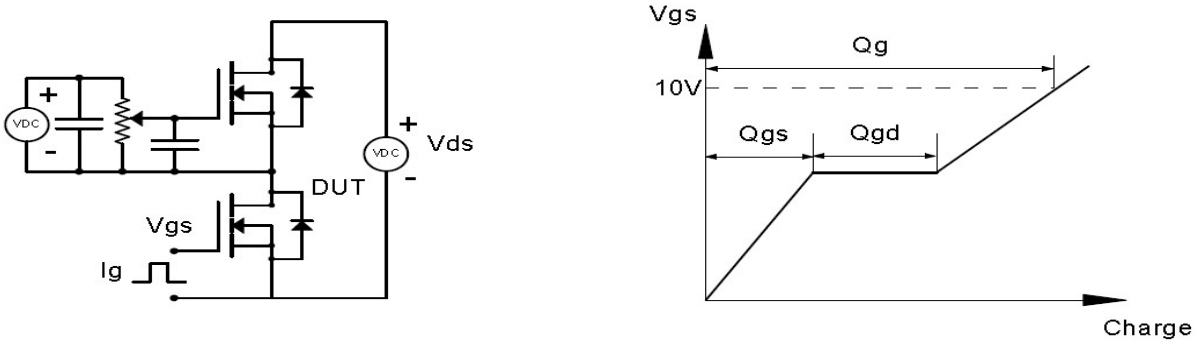


Fig 14: Max. Transient Thermal Impedance

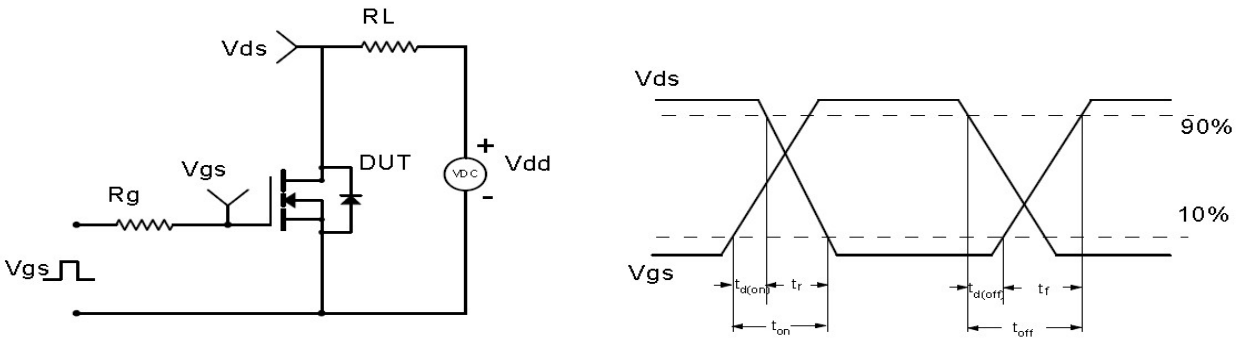


Test Circuit & Waveform

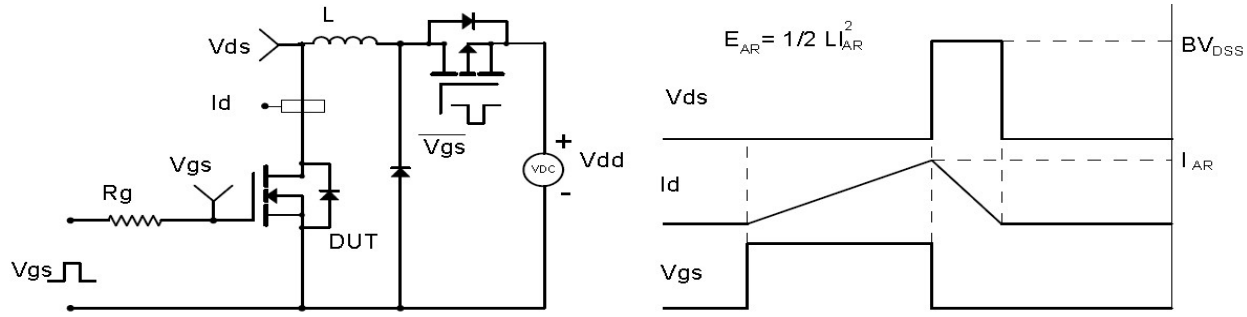
Gate Charge Test Circuit & Waveform



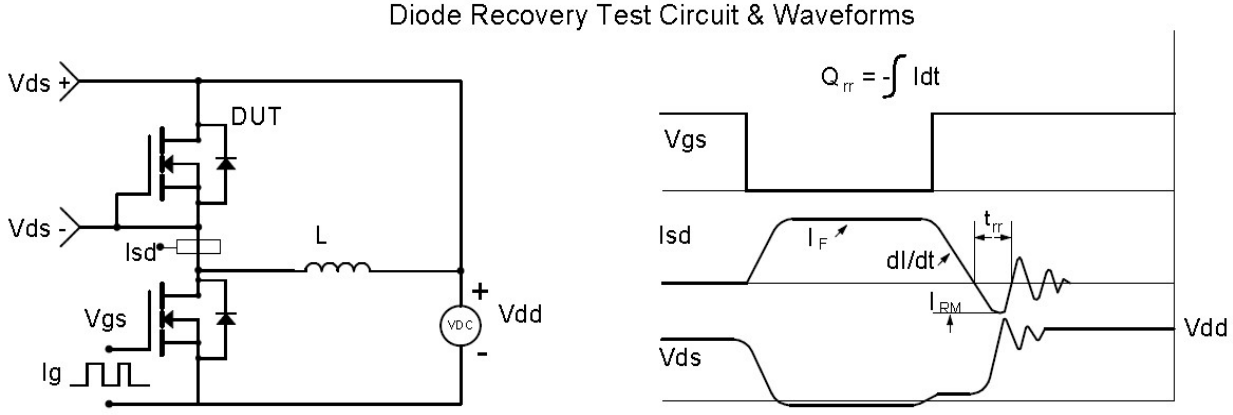
Resistive Switching Test Circuit & Waveforms



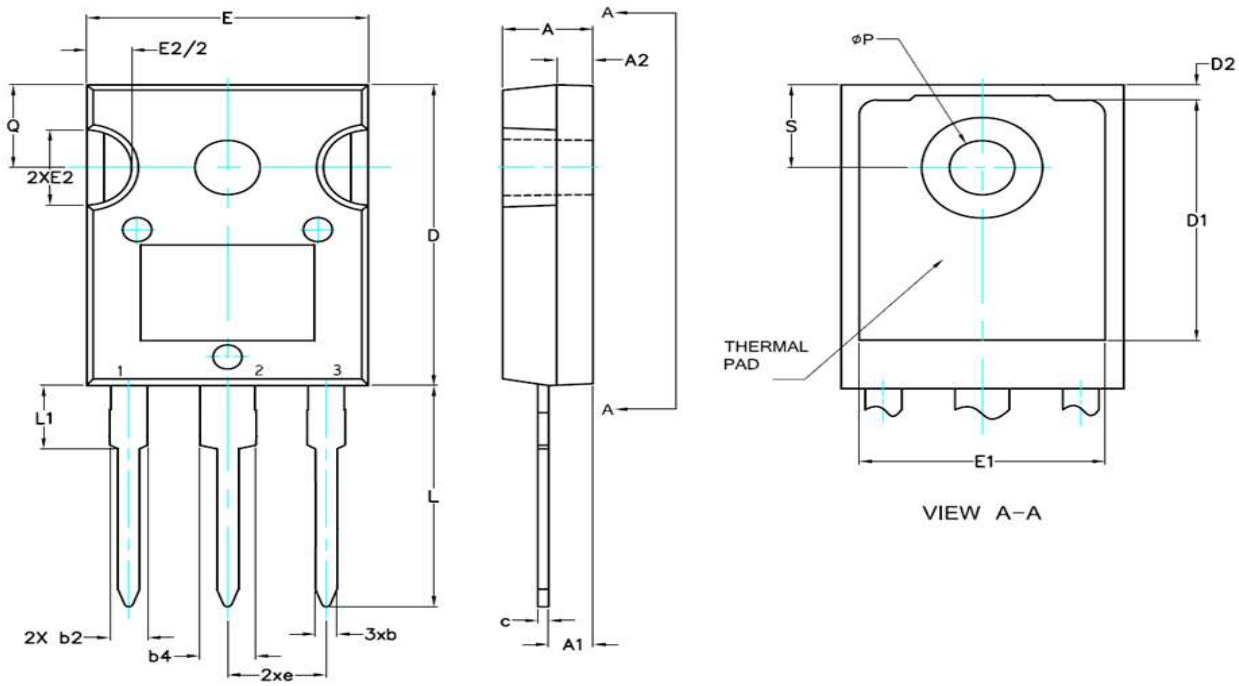
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: TO-247 Type T



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	

Revision History

Revision	Date	Major changes
1.0	2023/1/11	Release of Prelimnary version.
2.0	2023/3/20	Add C_{iss}/C_{oss}/C_{rss}/R_g spec

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.