华润微电子(重庆)有限公司

CRTS240N20NZ

Trench N-MOSFET 200V, 21mΩ, 63A

Features

- Uses CRM(CQ) advanced Trench 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
- UPS (Uninterrupible Power Supplies)

Product Summary

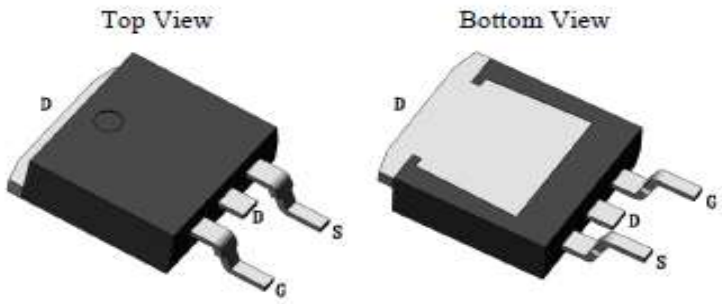
V_{DS}	200V
$R_{DS(on)}$ typ.	21mΩ
I_D	63A

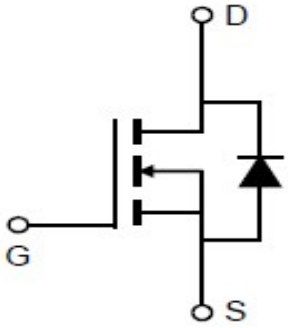
100% DVDS Tested

100% Avalanche Tested

RoHS HF

TO-263





Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRTS240N20NZ	CRTS240N20NZ	TO-263	Reel	N/A	N/A	800pcs

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	 63 160 40	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	252	A
Avalanche energy, single pulse (L=0.5mH, Rg=25Ω)	E_{AS}	102	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	260	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)	T_{sold}	260	°C

©China Resources Microelectronics (Chongqing) Limited

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	0.48	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}*	93	

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}	- -	- -	10 100	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	$R_{DS(on)}$	- -	21 51	26 64	mΩ	V_{GS}=10V, I_D=30A, T_j=25°C T_j=150°C
Transconductance	g_{fs}	-	79	-	S	V_{DS}=5V,I_D=30A
Dynamic Characteristic						
Input Capacitance	C_{iss}	2898	4347	6521	pF	V_{GS}=0V, V_{DS}=100V, f=1MHz
Output Capacitance	C_{oss}	176	264	396		
Reverse Transfer Capacitance	C_{rss}	34	51	102		
Gate Total Charge	Q_G	-	78	-	nC	V_{GS}=10V, V_{DS}=100V, I_D=30A, f=1MHz
Gate-Source charge	Q_{gs}	-	25	-		
Gate-Drain charge	Q_{gd}	-	27	-		
Turn-on delay time	$t_{d(on)}$	-	26	-	ns	V_{GS}=10V, V_{DD}=100V, Id=30A, R_{G_ext}=2.7Ω
Rise time	t_r	-	73	-		
Turn-off delay time	$t_{d(off)}$	-	69	-		
Fall time	t_f	-	61	-		
Gate resistance	R_G	0.2	5	10	Ω	V_{GS}=0V, V_{DS}=0V, f=1MHz

©China Resources Microelectronics (Chongqing) Limited

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 Forward Current	I_S			63	A	T_C = 25°C
Body Diode Reverse Recovery Time	t_{rr}	-	107	-	ns	I_F=30A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	552	-	nC	

*The value of R_{thJA} is measured by placing the device in a still air box which is one cubic foot.

©China Resources Microelectronics (Chongqing) Limited

Typical Performance Characteristics

Fig 1: Output Characteristics

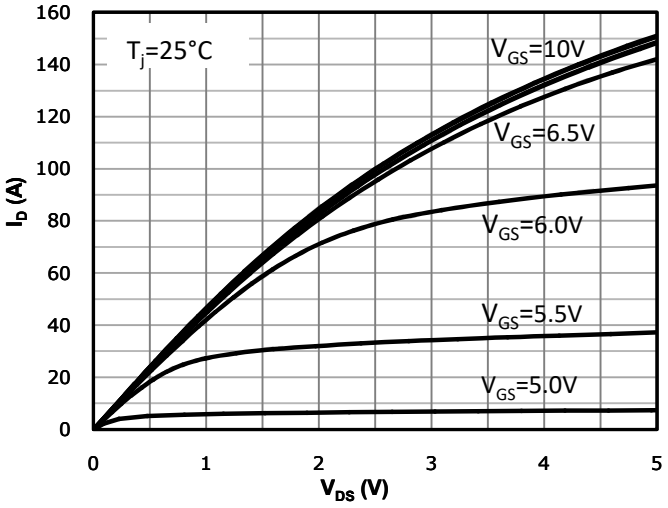


Fig 2: Transfer Characteristics

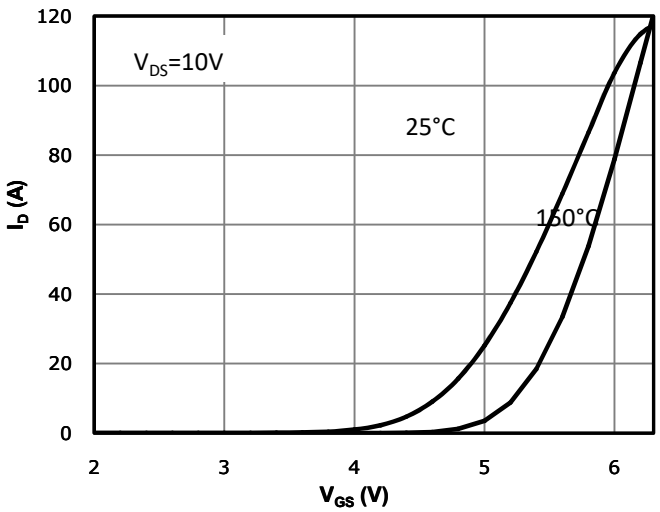


Fig 3: Rds(on) vs Drain Current and Gate Voltage

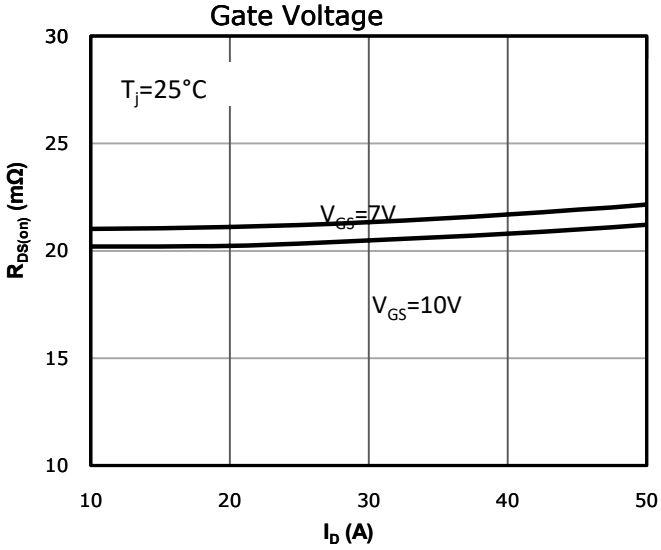


Fig 4: Rds(on) vs Gate Voltage

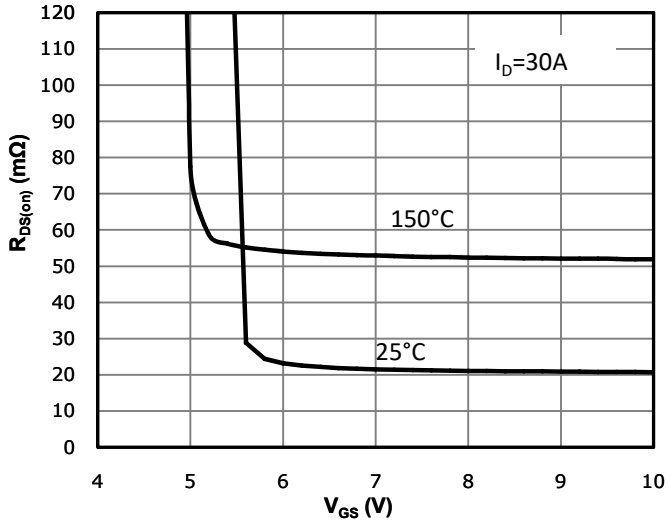


Fig 5: Rds(on) vs. Temperature

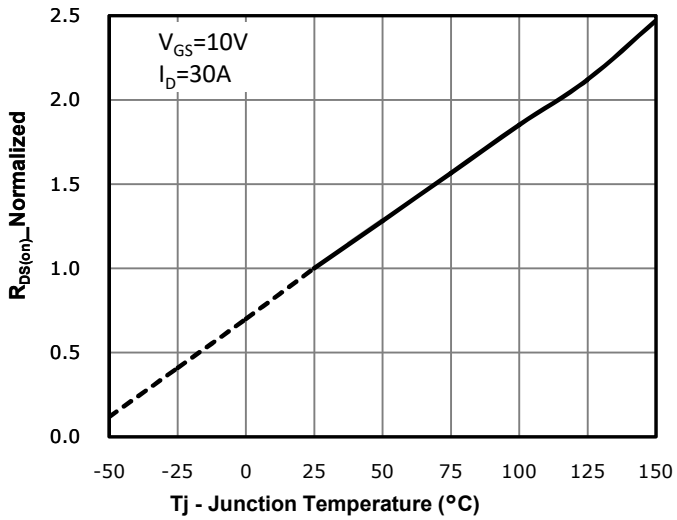
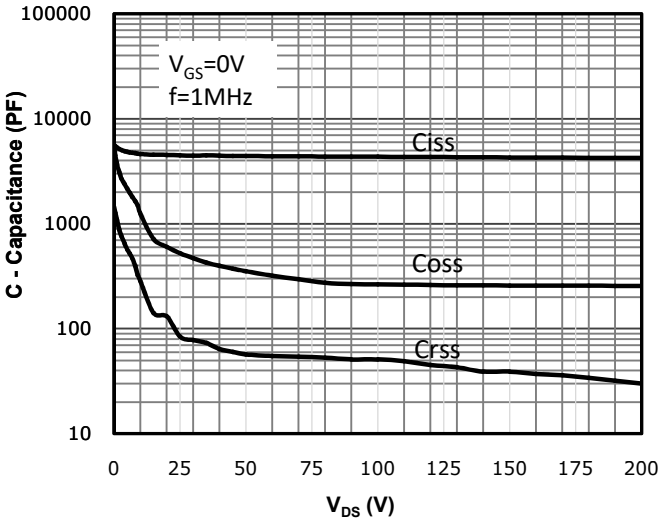


Fig 6: Capacitance Characteristics



©China Resources Microelectronics (Chongqing) Limited

Fig 7: VTH vs. Temperature

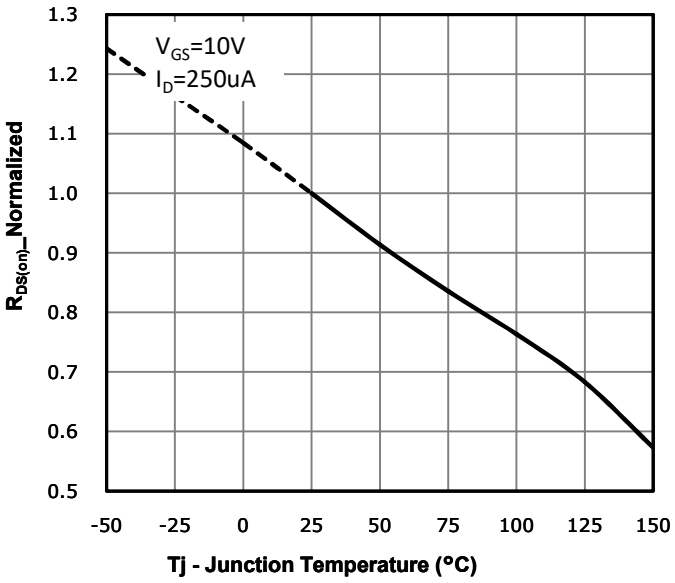


Fig 8: BVDS vs. Temperature

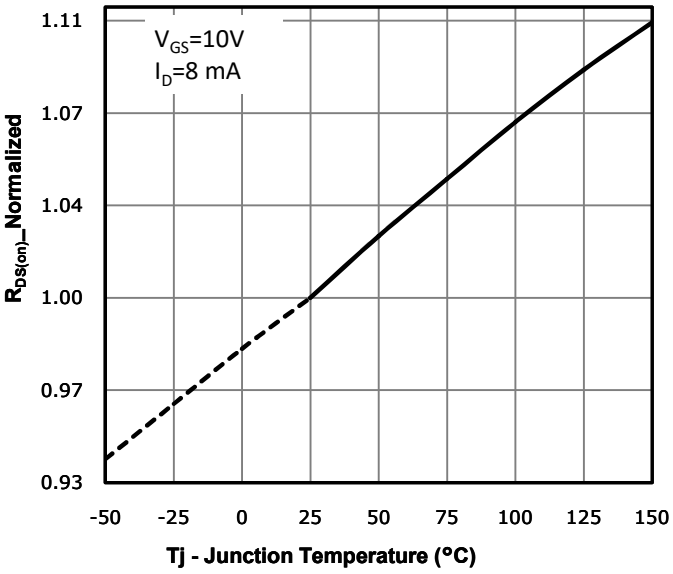


Fig 9: Gate Charge Characteristics

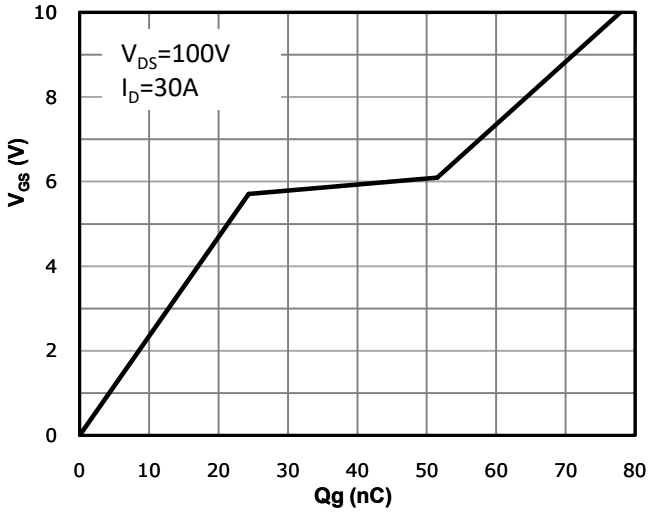


Fig 10: Body-diode Forward Characteristics

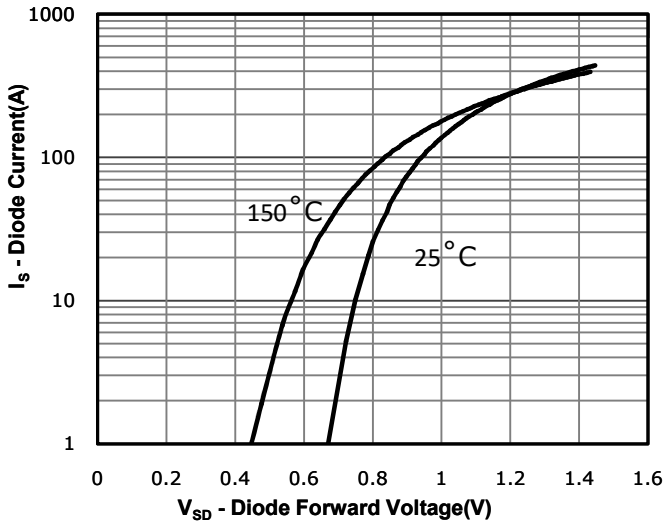


Fig 11: Power Dissipation

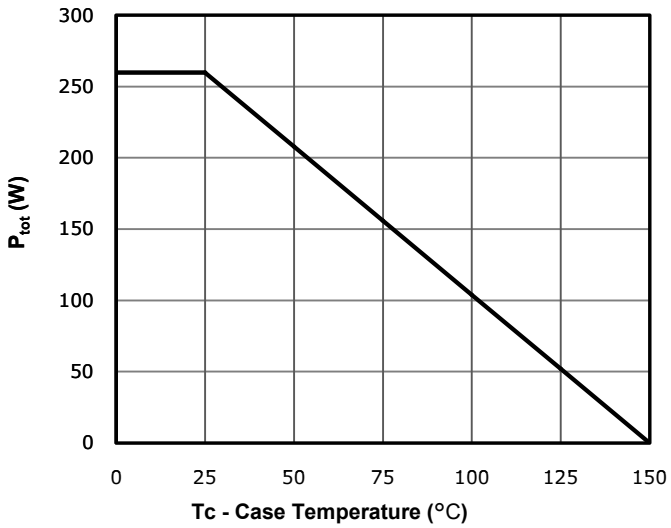
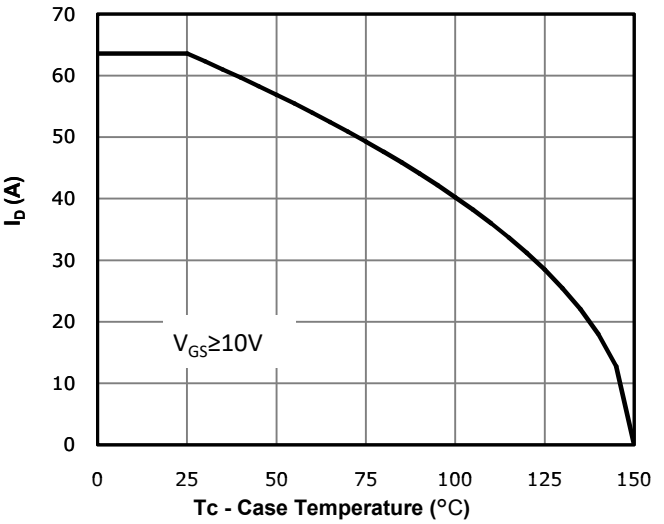


Fig 12: Drain Current Derating



©China Resources Microelectronics (Chongqing) Limited

Fig 13: Safe Operating Area

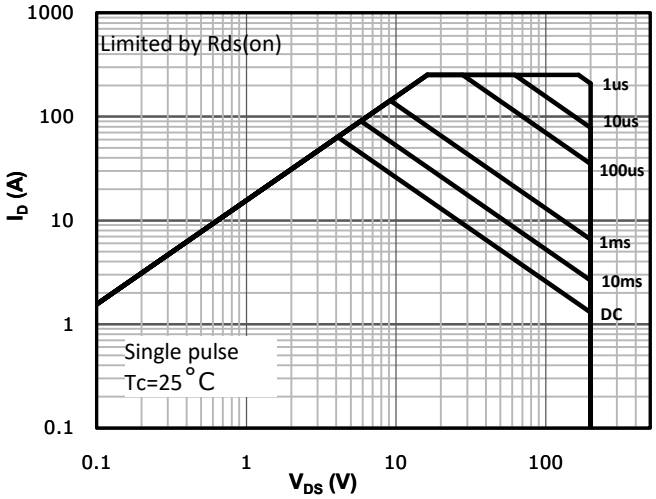
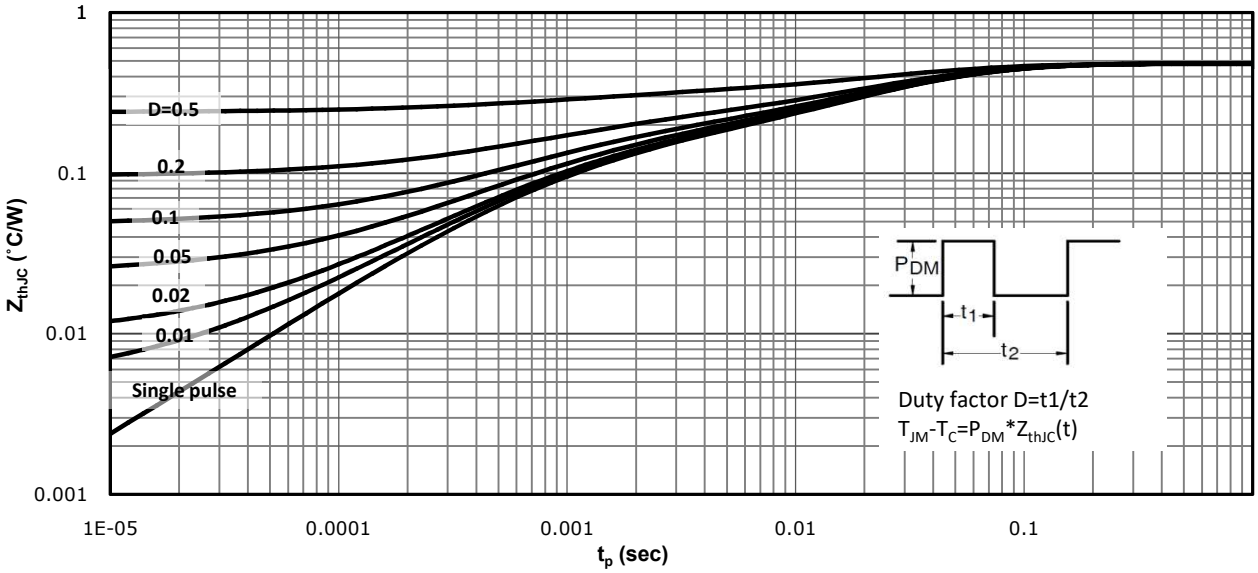


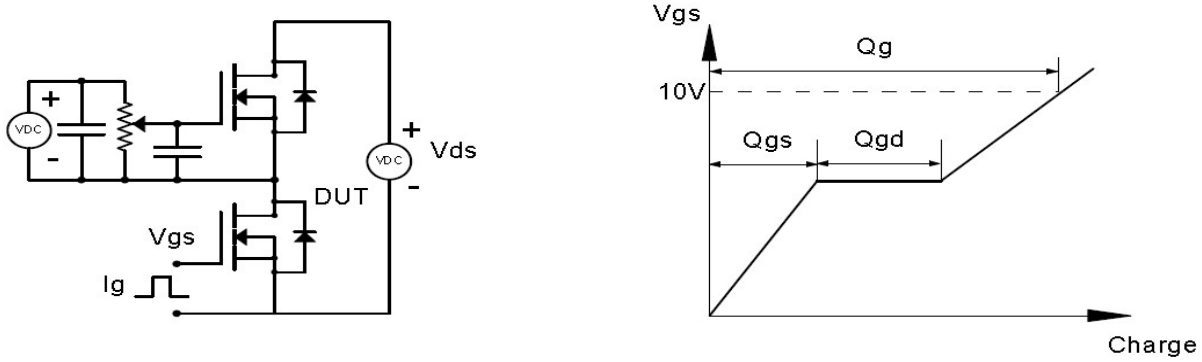
Fig 14: Max. Transient Thermal Impedance



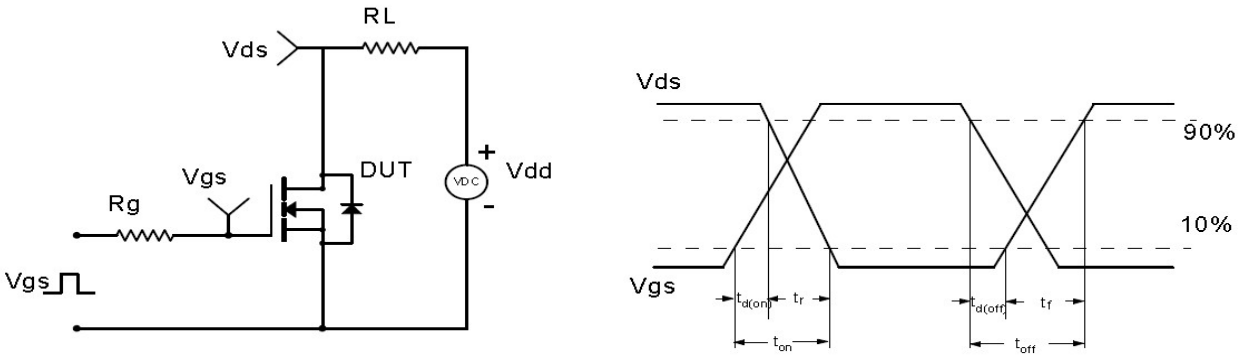
©China Resources Microelectronics (Chongqing) Limited

Test Circuit & Waveform

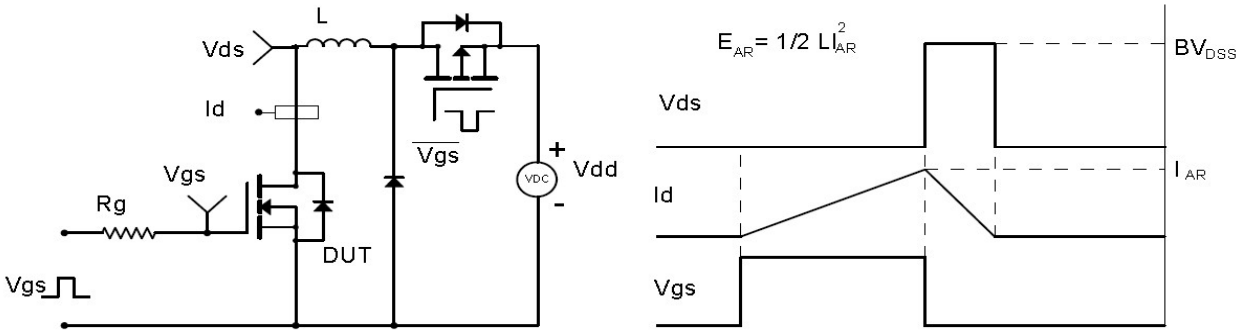
Gate Charge Test Circuit & Waveform



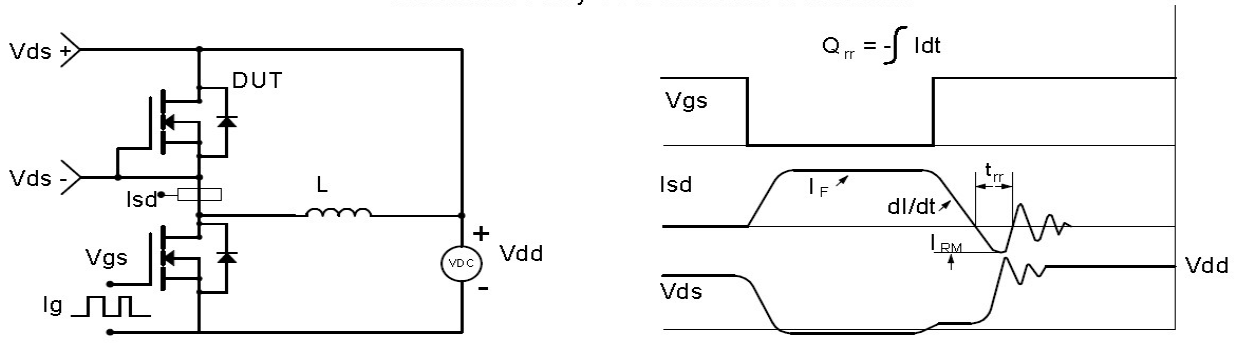
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

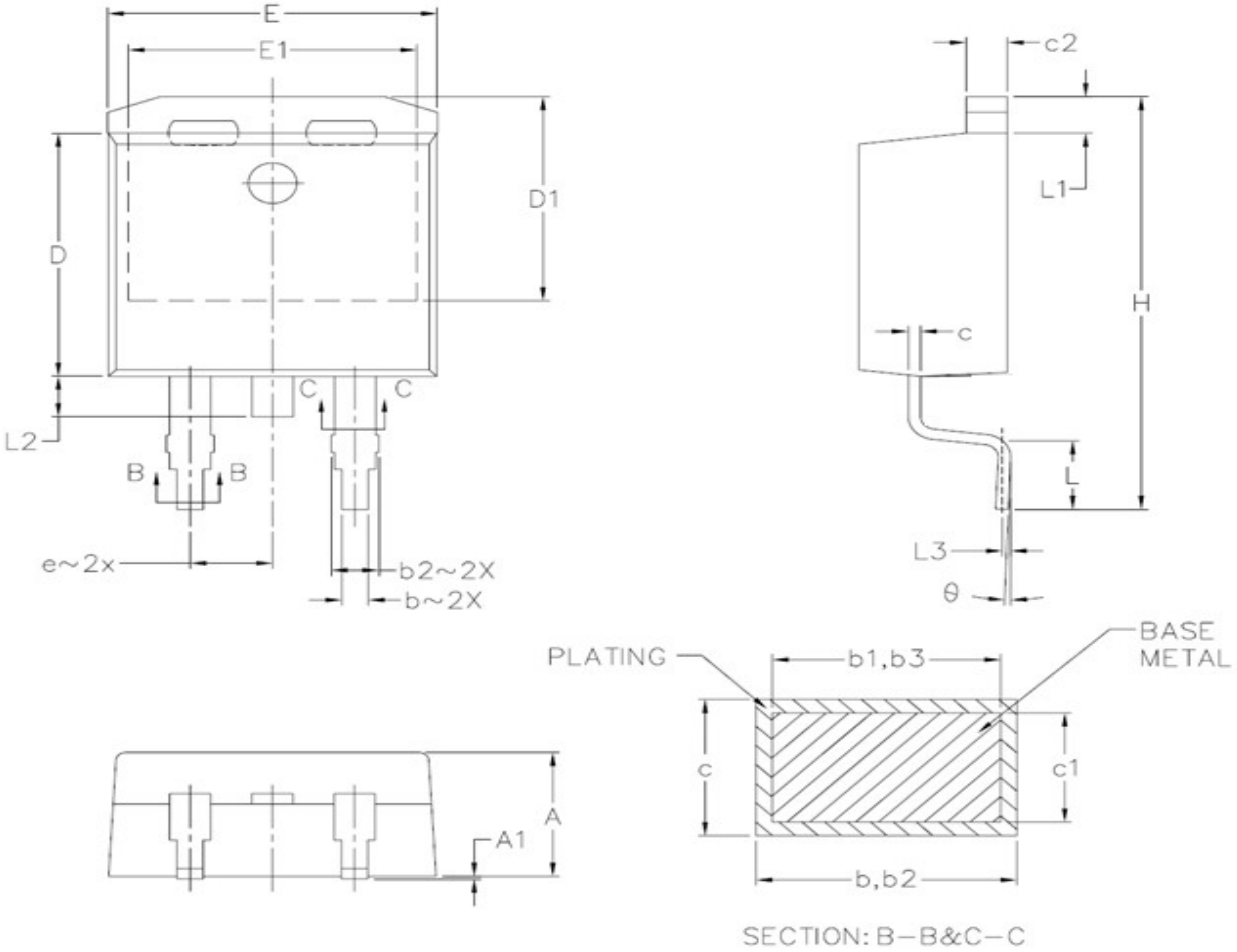


Diode Recovery Test Circuit & Waveforms



©China Resources Microelectronics (Chongqing) Limited

Package Outline: TO-263 Type T



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.50	0.99	0.020	0.039
b2	1.14	1.78	0.045	0.070
c	0.33	0.74	0.013	0.029
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380
D1	6.86	--	0.270	--
e	2.54 BSC.		0.100 BSC.	
E	9.65	10.67	0.380	0.420
E1	6.22	--	0.245	--
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	--	1.68	--	0.066
L2	--	1.78	--	0.070
L3	0.254 BSC.		0.010 BSC.	
θ	0°	8°	0°	8°

©China Resources Microelectronics (Chongqing) Limited

Revision History

Revision	Date	Major changes
1.0	2023/1/11	Release of formal 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.

©China Resources Microelectronics (Chongqing) Limited