华润微电子(重庆)有限公司

CRTQ058N06N3Z

Trench N-MOSFET 60V, 5.8mΩ, 160A

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

Product Summary

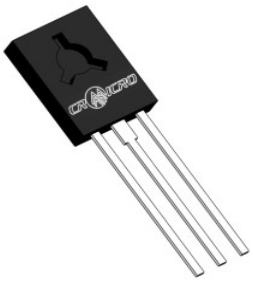
V_{DS}	60V
$R_{DS(on).max}$	5.8mΩ
I_D	160A

Applications

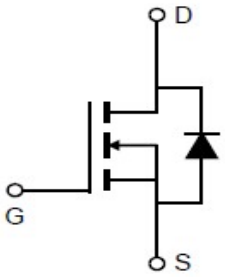
- Motor control and drive
- Battery management
- UPS (Uninterrupible Power Supplies)
- Hot swap
- Load switch
- Soft start

100% DVDS Tested
100% Avalanche Tested

RoHS HF



CRTQ058N06N3Z



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRTQ058N06N3Z	CRTQ058N06N3Z	TO-247	Tube	N/A	N/A	25pcs

Absolute Maximum Ratings

Parameter	**Symbol**	**Value**	**Unit**
Drain-source voltage	V_{DS}	60	V
Continuous drain current T_C = 25°C (Silicon limit) T_C = 25°C (Package limit) T_C = 100°C (Silicon limit)	I_D	 170 160 107	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	640	A
Avalanche energy, single pulse (I_D = 86A, Rg=25Ω)[1]	E_{AS}	1830	mJ
Gate-Source voltage	V_{GS}	±25	V
Power dissipation (T_C = 25°C)	P_{tot}	284	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)	Tsold	260	°C

※. Notes:

1.EAS is tested at starting Tj = 25℃, L = 0.5mH, IAS =86A, 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}	0.44	°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}	60	-	-	V	V_{GS}=0V, I_D=250uA
		60	-	-	V	V_{GS}=0V, I_D=1mA
Gate threshold voltage	$V_{GS(th)}$	2.4	3.0	3.6	V	V_{DS}=V_{GS}, I_D=250uA
Zero gate voltage drain current	I_{DSS}	- -	- -	1 100	μA	V_{DS}=60V,V_{GS}=0V T_j=25°C T_j=125°C
Gate-source leakage current	I_{GSS}	0	-	±100	nA	V_{GS}=±25V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	4.4	5.8	mΩ	V_{GS}=10V, ID=50A
Transconductance	g_{fs}	-	59	-	S	V_{DS}=5V, I_D=50A
Dynamic Characteristic						
Input Capacitance	C_{iss}	5662	8493	12740	pF	V_{GS}=0V, V_{DS}=30V, f=1MHz
Output Capacitance	C_{oss}	807	1210	1815		
Reverse Transfer Capacitance	C_{rss}	406	811	1622		
Gate Total Charge	Q_G	117	175	351	nC	V_{GS}=10V, V_{DS}=30V, I_D=50A
Gate-Source charge	Q_{gs}	32	48	96		
Gate-Drain charge	Q_{gd}	36	71	143		
Turn-on delay time	$t_{d(on)}$	24	48	96	ns	V_{GS}=10V, V_{DD}=30V, RG_ext=2.7Ω
Rise time	t_r	55	82	164		
Turn-off delay time	$t_{d(off)}$	61	92	184		
Fall time	t_f	31	46	92		
Gate resistance	R_G	0.2	1.2	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}	-	0.85	1.25	V	V_{GS}=0V,I_{SD}=50A
Body Diode Continuous Forward Current	I_S	-	-	160	A	T_C = 25°C
Body Diode Reverse Recovery Time	t_{rr}	-	90	-	ns	I_F=50A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	220	-	nC	

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Typical Performance Characteristics

Fig 1: Output Characteristics

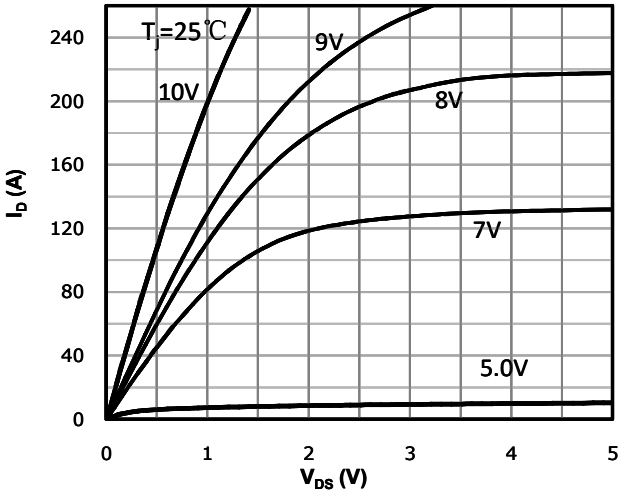


Fig 2: Transfer Characteristics

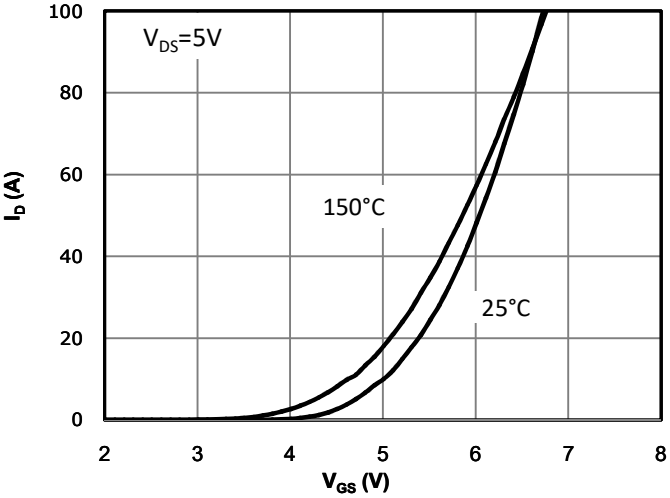


Fig 3: Rds(on) vs Drain Current and Gate Voltage

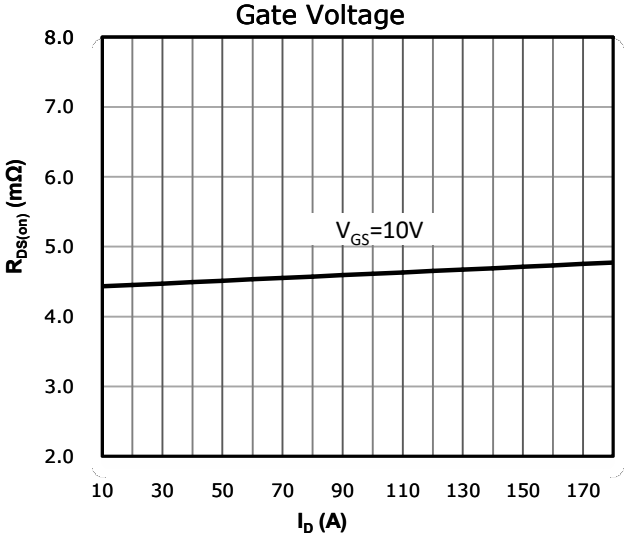


Fig 4: Rds(on) vs Gate Voltage

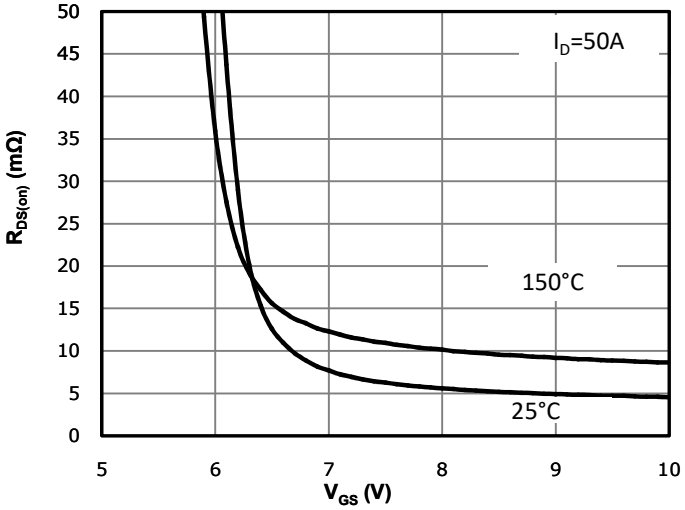


Fig 5: Rds(on) vs. Temperature

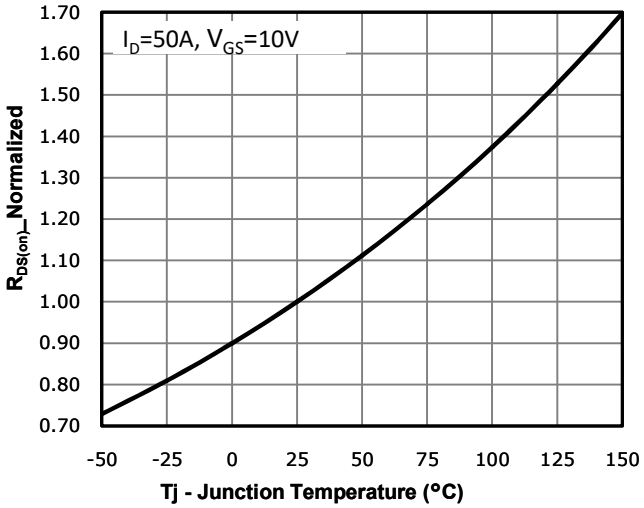
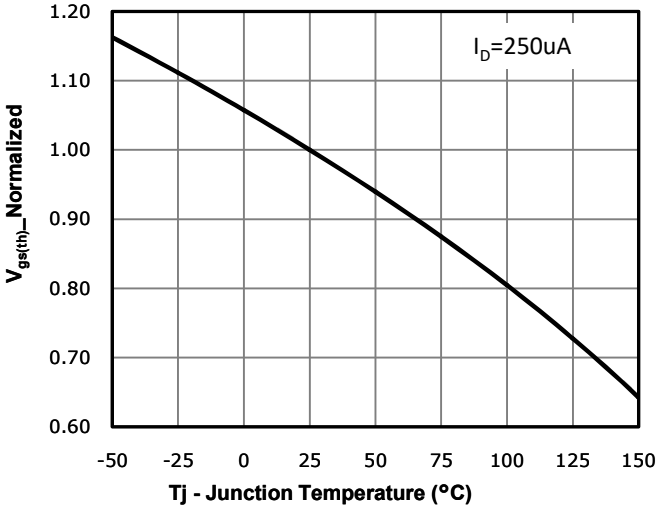


Fig 6: Vgs(th) vs. Temperature



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Fig 7: BVdss vs. Temperature

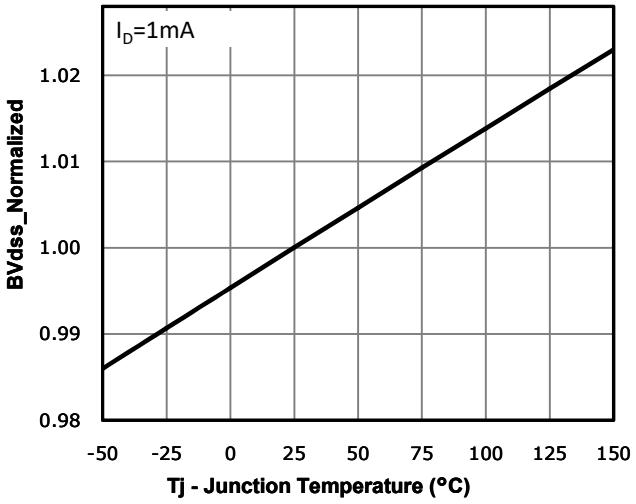


Fig 8: Capacitance Characteristics

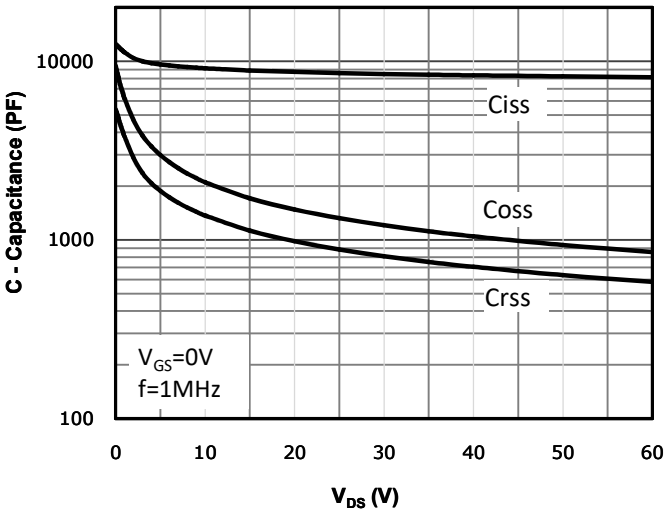


Fig 9: Gate Charge Characteristics

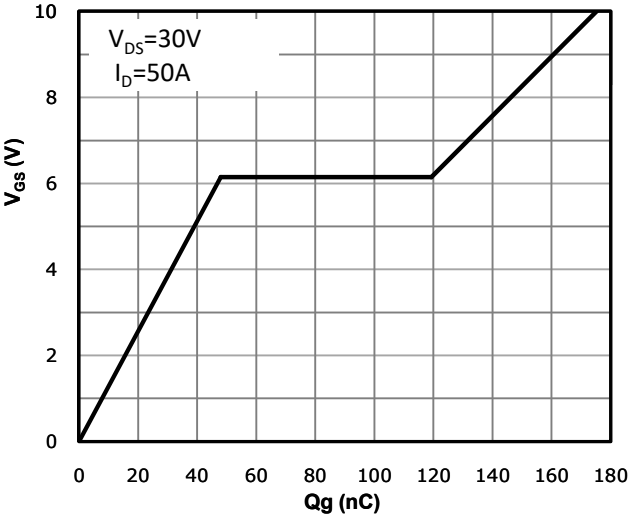


Fig 10: Body-diode Forward Characteristics

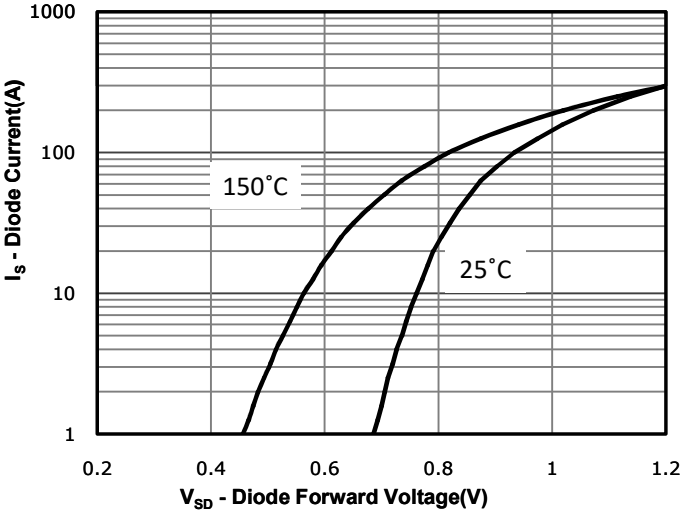


Fig 11: Power Dissipation

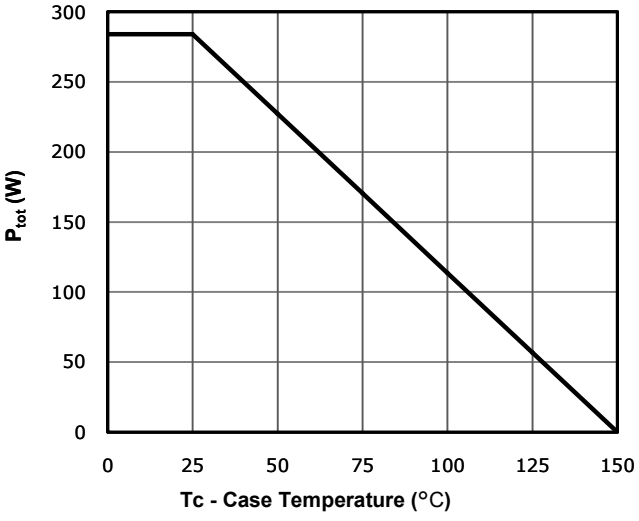
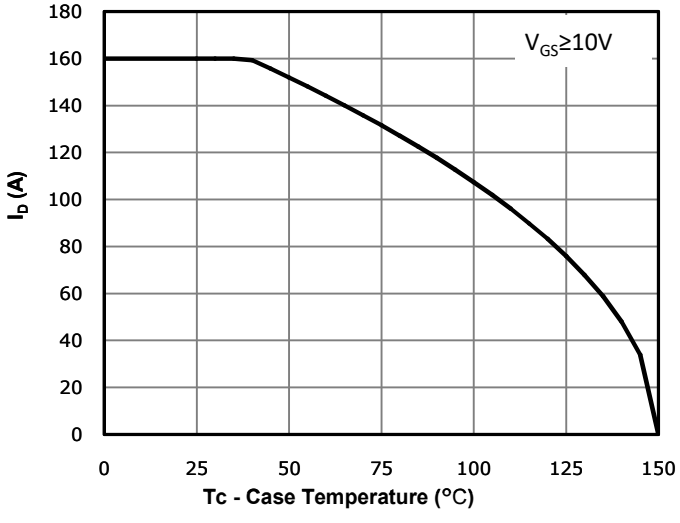


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

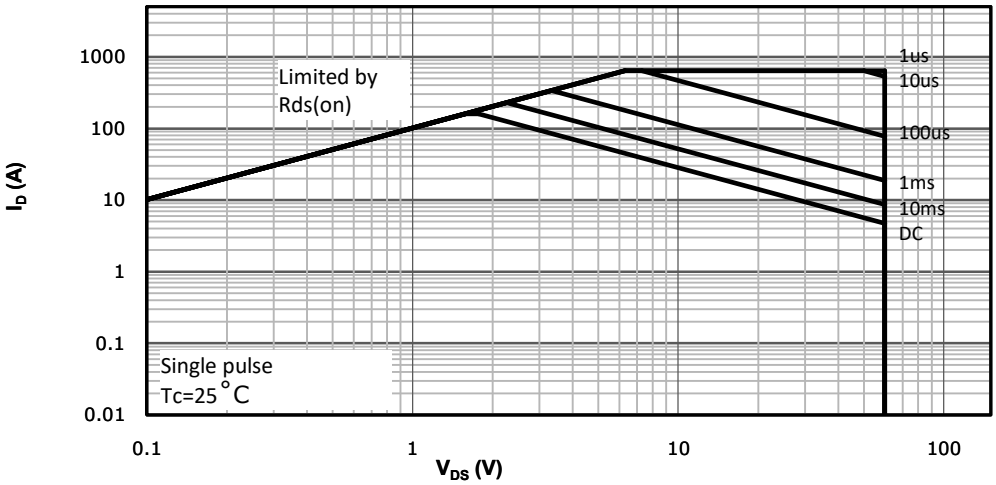
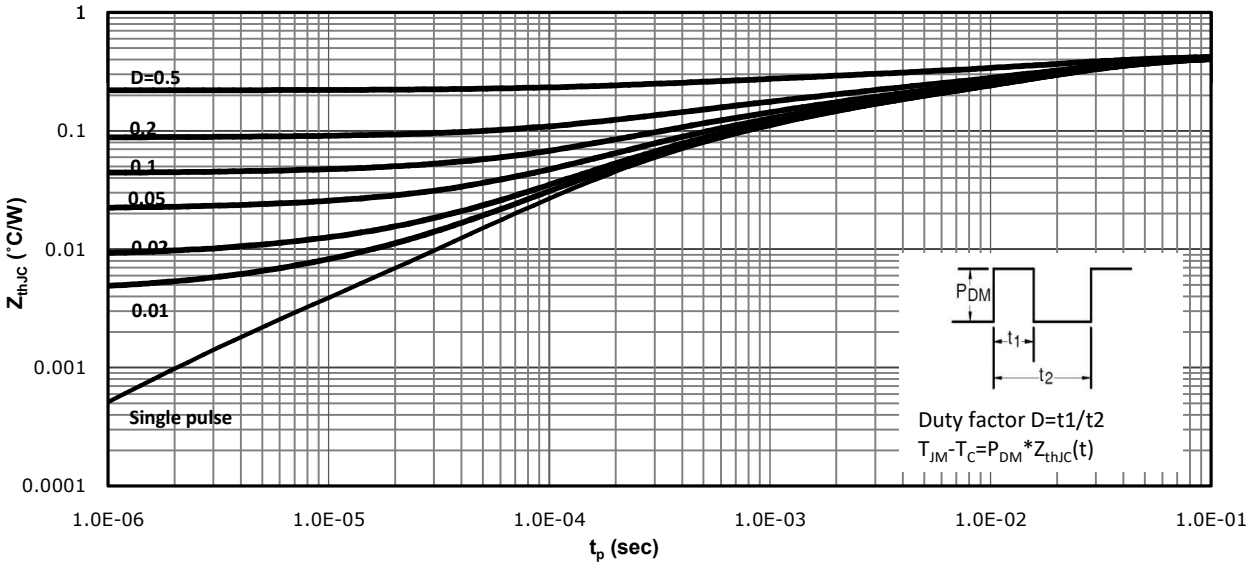


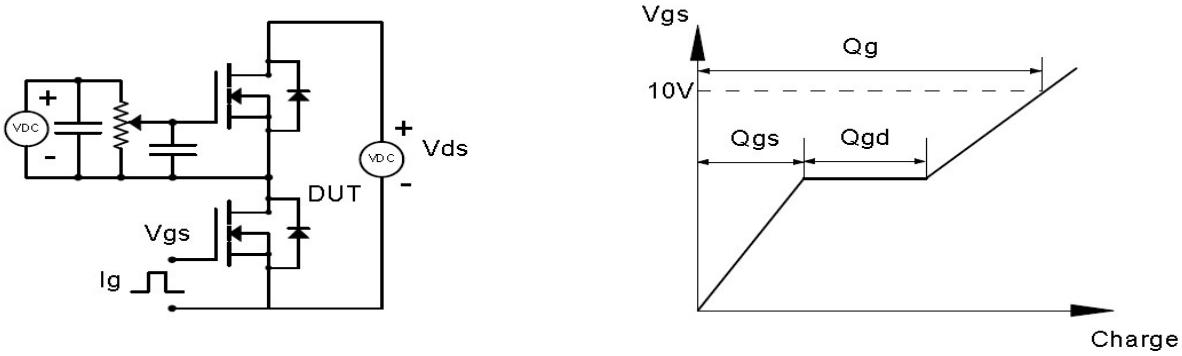
Fig 14: Max. Transient Thermal Impedance



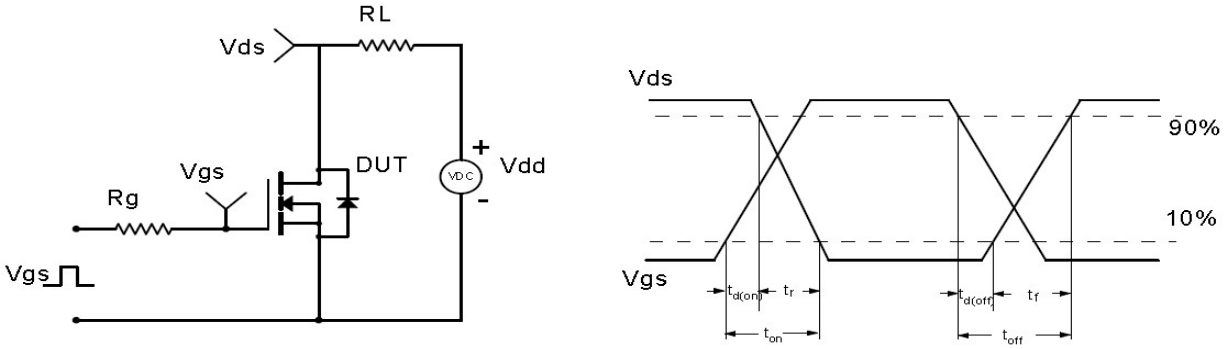
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Test Circuit & Waveform

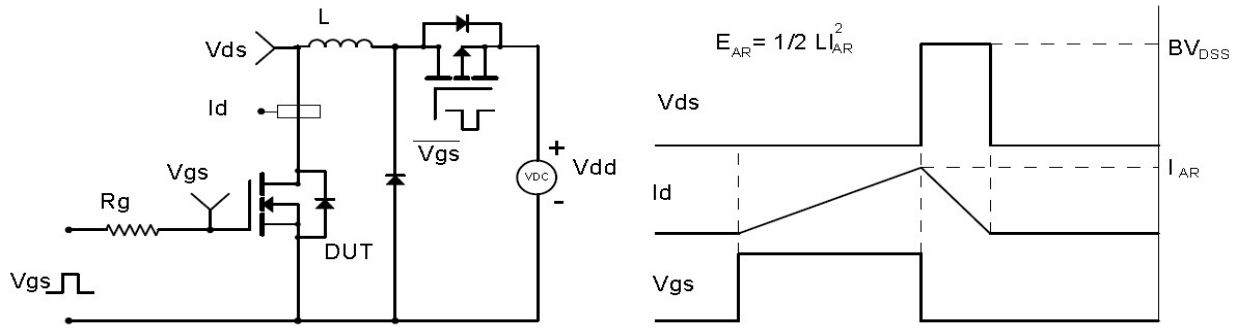
Gate Charge Test Circuit & Waveform



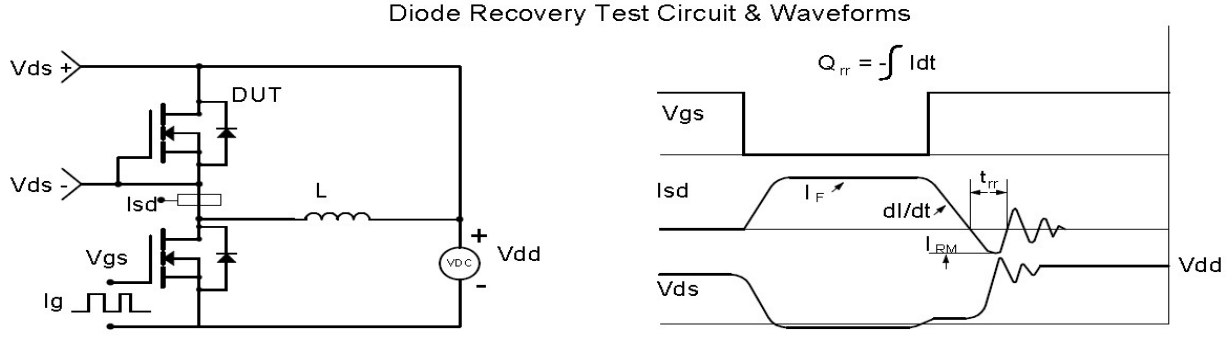
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

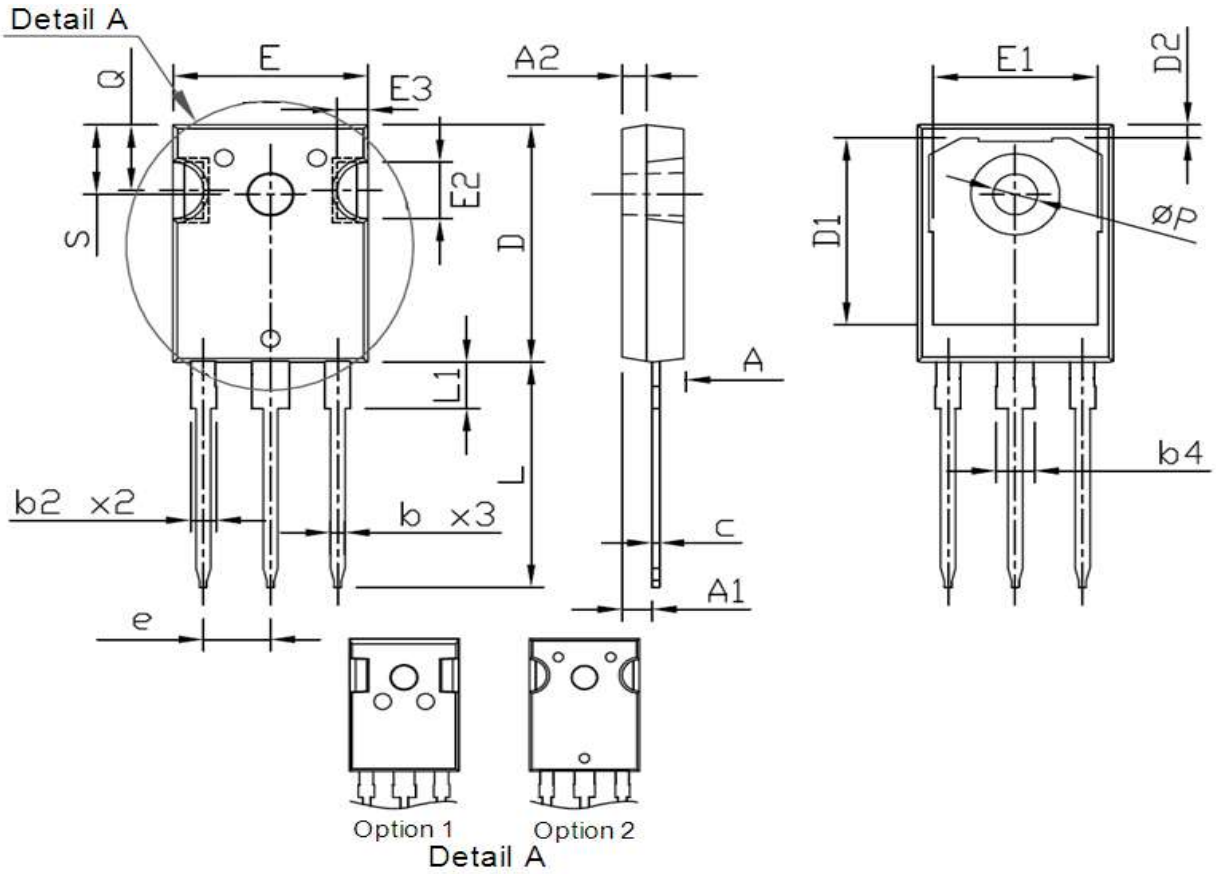


Diode Recovery Test Circuit & Waveforms



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Package Outline: TO-247



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.70	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

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Marking



NOTE:
NXBBAAAA-Y

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	2024/5/10	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 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.

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