华润微电子(重庆)有限公司

CRTD140P03L

TrenchMOS P-MOSFET -30V, 11.6mΩ, -44A

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

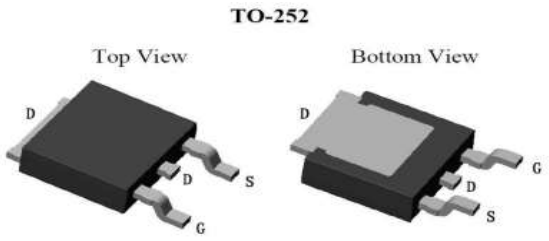
- Motor control and drive
- Battery management System
- UPS (Uninterrupible Power Supplies)

Product Summary

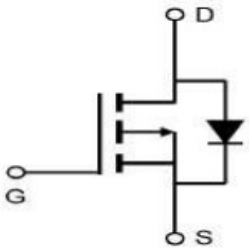
V_{DS}	-30V
$R_{DS(on).typ}$	11.6mΩ
I_D	-44A

100% DVDS Tested
100% Avalanche Tested

RoHS HF



CRTD140P03L



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRTD140P03L	CRTD140P03L	TO-252	REEL	N/A	N/A	2500pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	-30	V
Continuous drain current T_C = 25°C (Silicon limit) T_C = 25°C (Package limit) T_C = 100°C (Silicon limit)	I_D	 -44 -80 -28	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	-176	A
Avalanche energy, single pulse (I_D = 25 A, Rg=25Ω)[1]	E_{AS}	156	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	39	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 =25A, VGS = -10V.

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Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	3.23	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	80	

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}	-30	-	-	V	V_{GS}=0V, I_D=-250uA
		-30	-	-	V	V_{GS}=0V, I_D=-1mA
Gate threshold voltage	$V_{GS(th)}$	-1.0	-1.6	-2.5	V	V_{DS}=V_{GS},I_D=-250uA
Zero gate voltage drain current	I_{DSS}	- -	- -	-1 -20	μA	V_{DS}=-30V,V_{GS}=0V T_j=25°C T_j=125°C
Gate-source leakage current	I_{GSS}	0	-	±100	nA	V_{GS}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$		11.6	14	mΩ	VGS=-10V, ID=-14A
		-	17	25		VGS=-4.5V, ID=-10A
Transconductance	g_{fs}	-	35	-	S	V_{DS}=-5V, I_D=-14A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	2027	-	pF	V_{GS}=0V, V_{DS}=-15V, f=1MHz
Output Capacitance	C_{oss}	-	321	-		
Reverse Transfer Capacitance	C_{rss}	-	194	-		
Gate Total Charge	Q_G	-	36	-	nC	V_{GS}=-10V, V_{DS}=-15V, I_D=-22A
Gate-Source charge	Q_{gs}	-	9	-		
Gate-Drain charge	Q_{gd}	-	7	-		
Turn-on delay time	$t_{d(on)}$	-	11	-	ns	V_{GS}=-10V, V_{DD}=-15V, R_{G_ext}=2.7Ω, ID=-22A
Rise time	t_r	-	85	-		
Turn-off delay time	$t_{d(off)}$	-	35	-		
Fall time	t_f	-	104	-		
Gate resistance	R_G	-	9	-	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	-1.3	V	V_{GS}=0V,I_{SD}=-14A
Body Diode Continuous Forward Current	Is	-	-	-44	A	Tc = 25°C
Body Diode Reverse Recovery Time	t_{rr}	-	19	-	ns	I_F=-22A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	4	-	nC	

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Typical Performance Characteristics

Fig 1: Output Characteristics

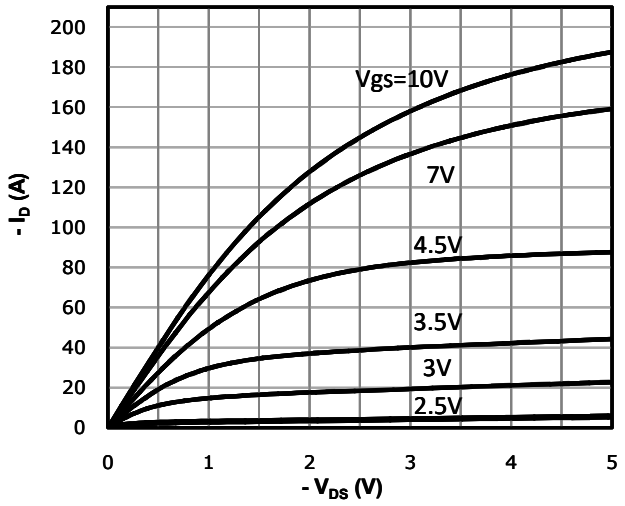


Fig 2: Transfer Characteristics

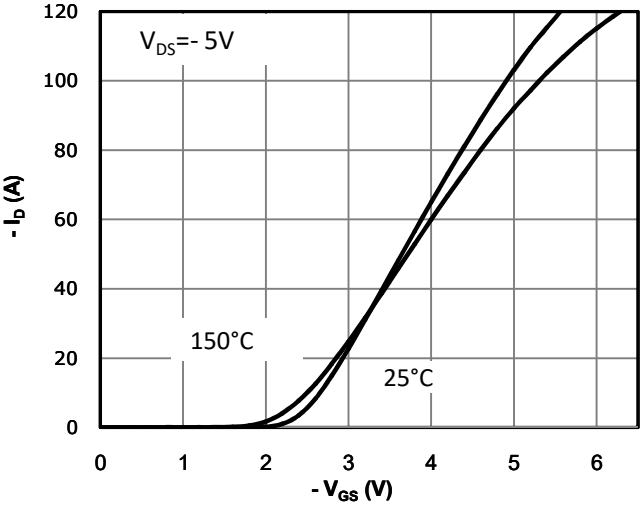


Fig 3: Rds(on) vs Drain Current and Gate Voltage

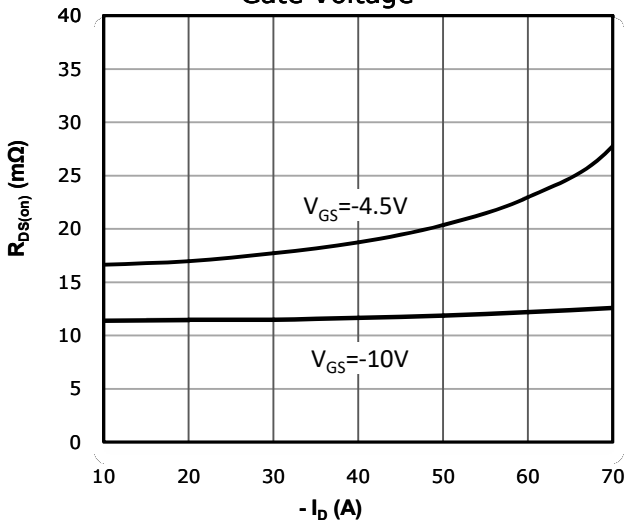


Fig 4: Rds(on) vs Gate Voltage

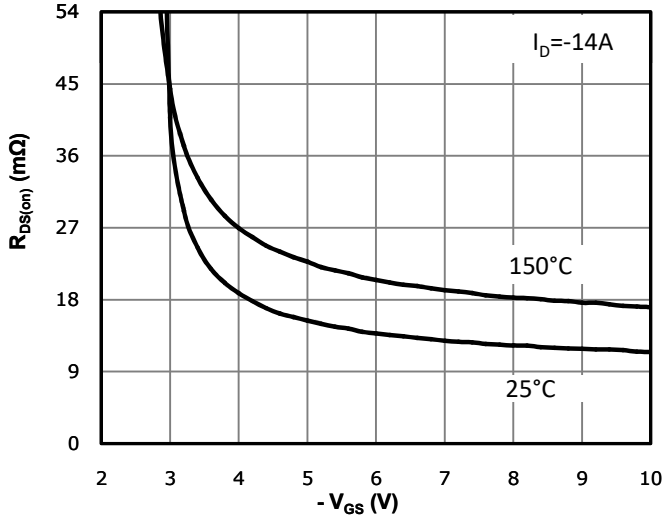


Fig 5: Rds(on) vs. Temperature

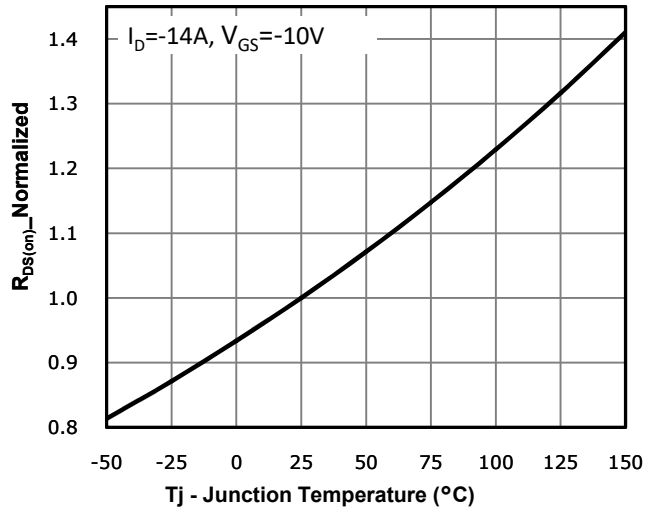
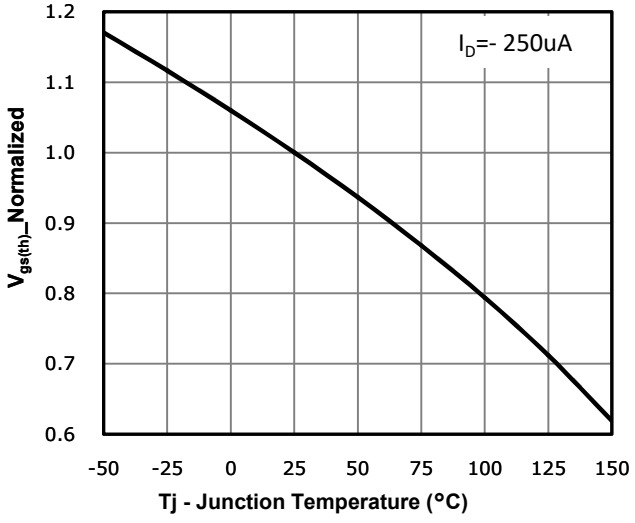


Fig 6: Vgs(th) vs. Temperature



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Fig 7: BVdss vs. Temperature

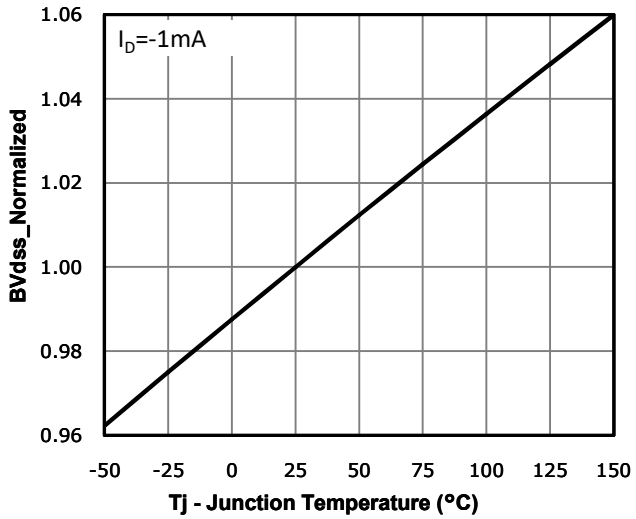


Fig 8: Capacitance Characteristics

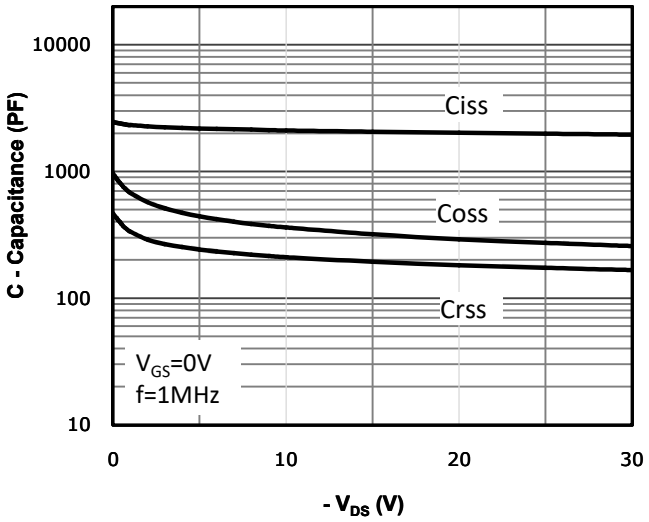


Fig 9: Gate Charge Characteristics

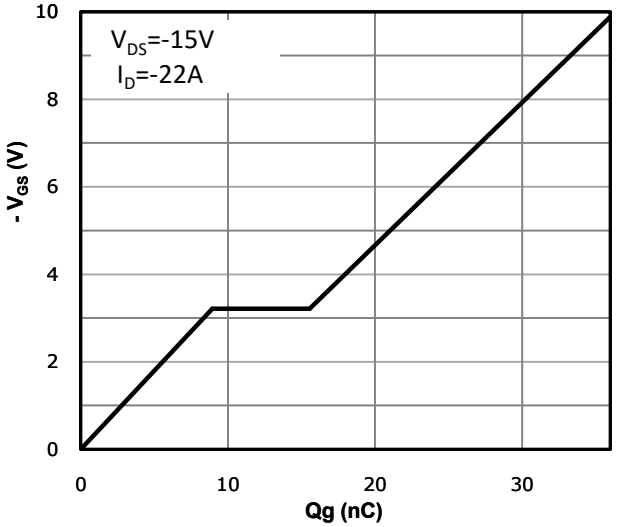


Fig 10: Body-diode Forward Characteristics

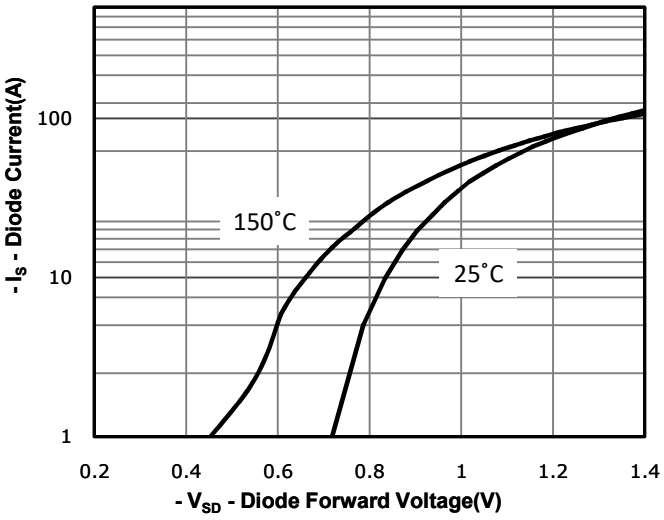


Fig 11: Power Dissipation

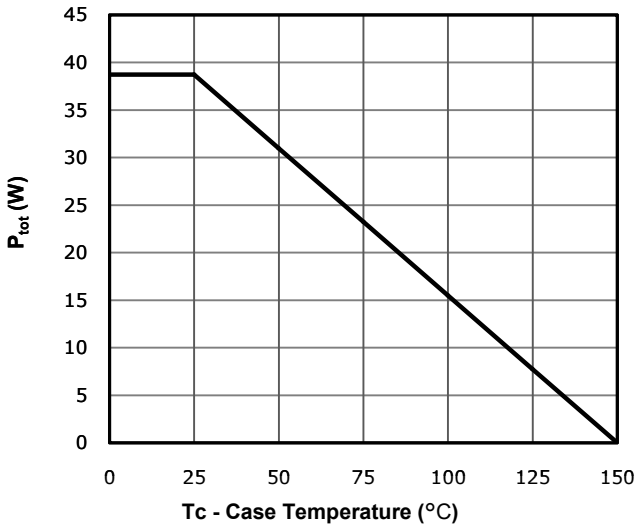
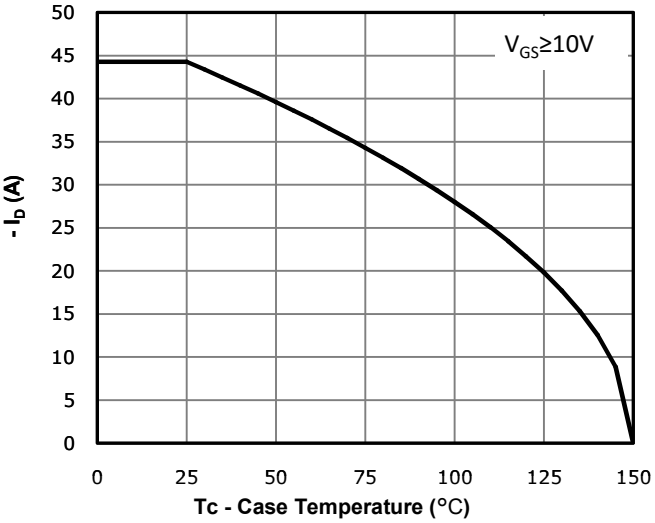


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

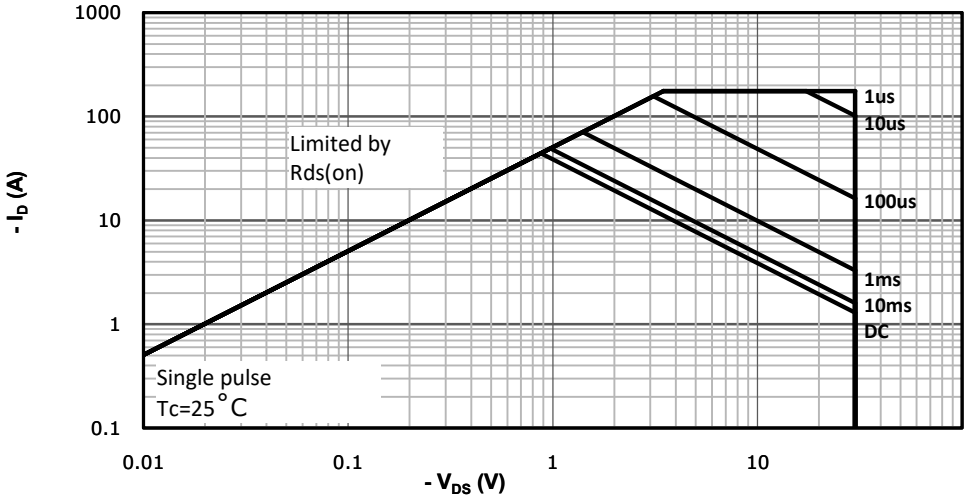
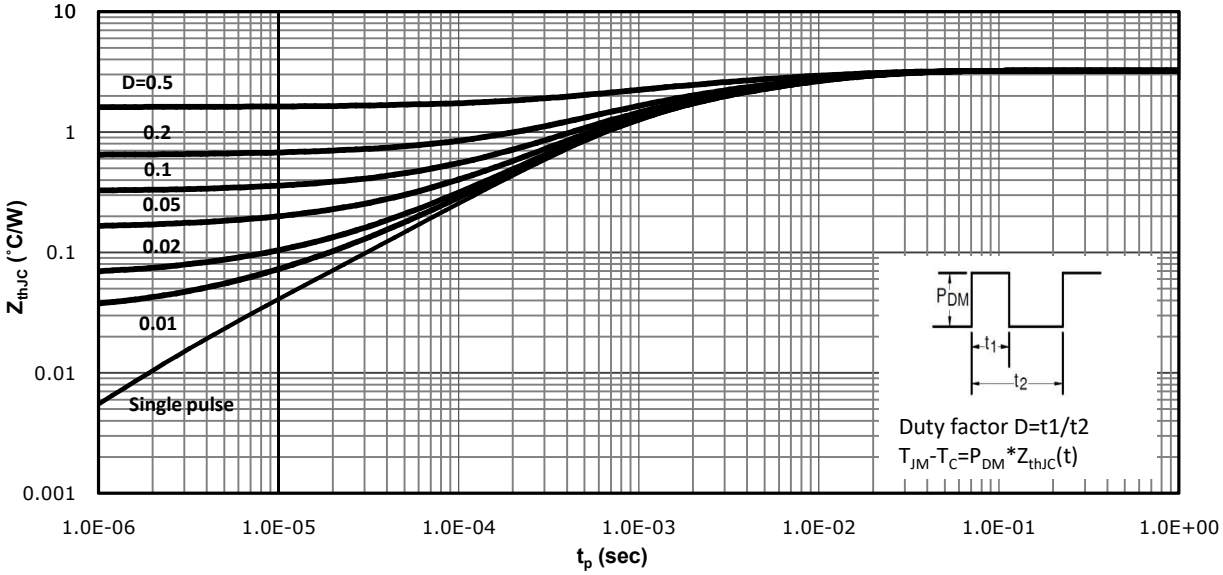


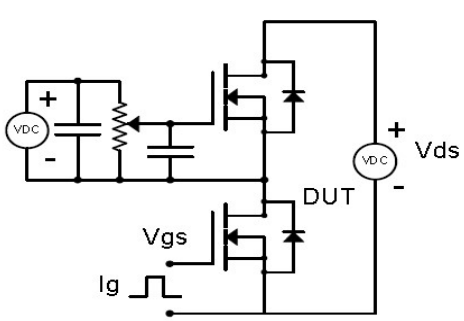
Fig 14: Max. Transient Thermal Impedance

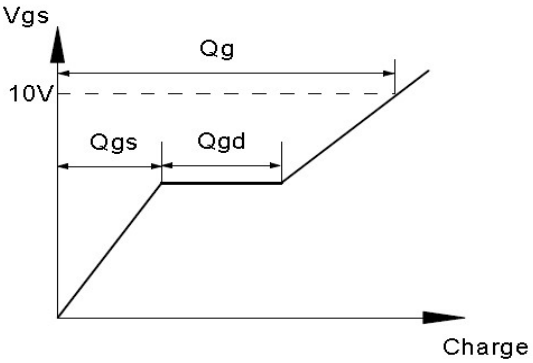


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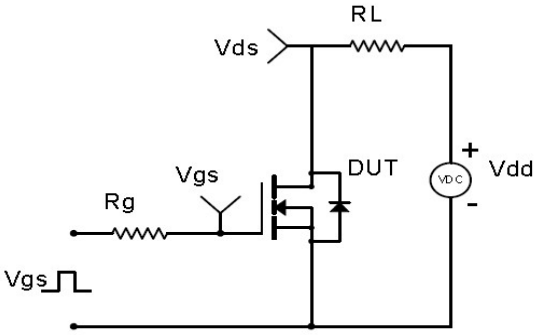
Test Circuit & Waveform

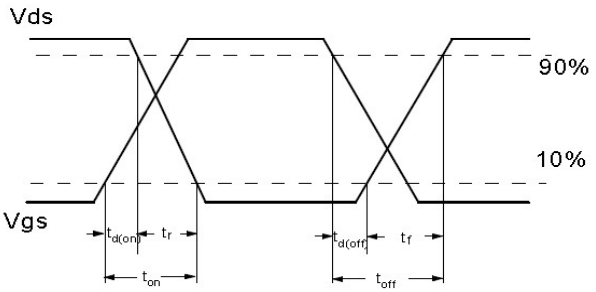
Gate Charge Test Circuit & Waveform



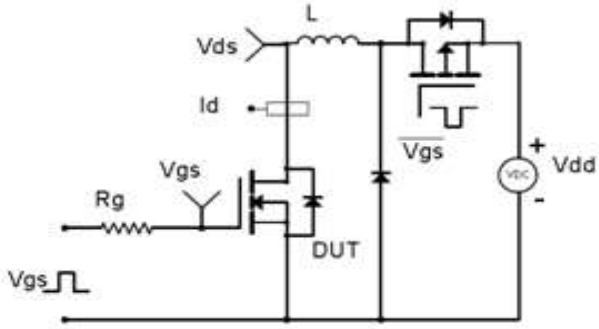


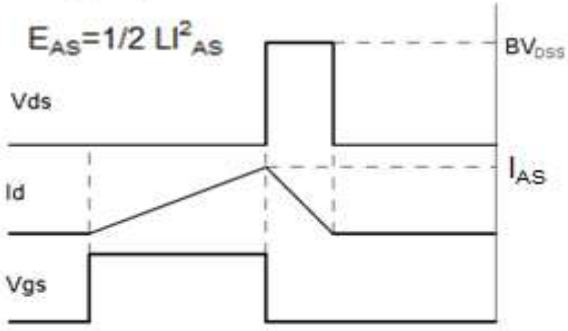
Resistive Switching Test Circuit & Waveforms



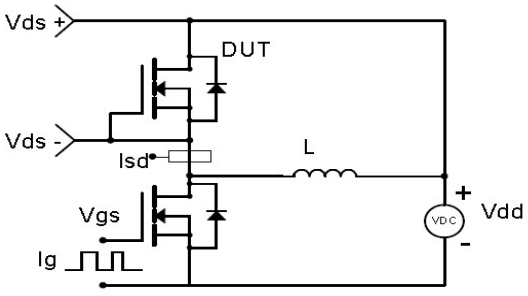


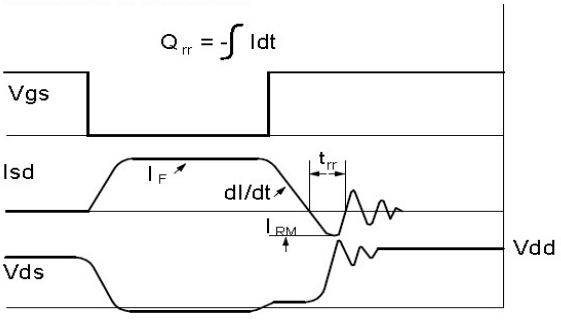
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





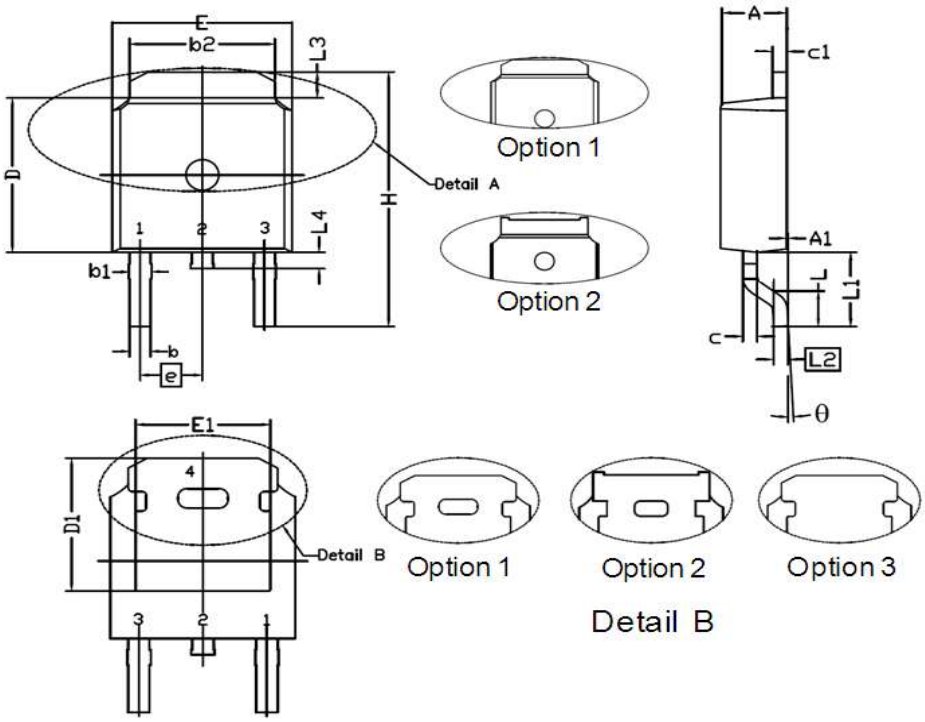
Diode Recovery Test Circuit & Waveforms





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Package Outline: TO-252



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.15	2.45	0.085	0.096
A1	0.00	0.15	0.000	0.006
b	0.60	0.91	0.024	0.036
b1	0.65	1.15	0.026	0.045
b2	5.00	5.64	0.197	0.222
c	0.45	0.61	0.018	0.024
c1	0.36	0.66	0.014	0.026
D	5.80	6.30	0.228	0.248
D1	5.21	--	0.205	--
e	2.29 BSC.		0.090 BSC.	
E	6.30	6.90	0.248	0.272
E1	4.40	--	0.173	--
H	9.40	10.48	0.370	0.413
L	1.38	1.78	0.054	0.070
L1	2.92 REF		0.115 REF	
L2	0.508 BSC.		0.020 BSC.	
L3	0.72	1.35	0.028	0.053
L4	0.60	1.20	0.024	0.047
θ	0°	10°	0°	10°

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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	2023/7/12	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 semiconductor 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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