华润微电子(重庆)有限公司

CR3401

Trench P-MOSFET -30V, 44mΩ, -4.2A

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

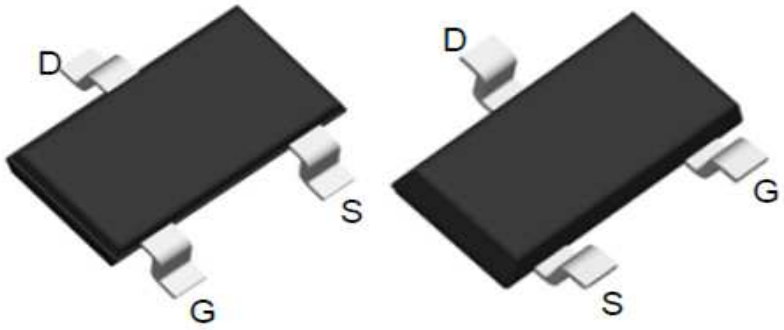
- Motor control and drive
- Battery management
- UPS (Uninterrupible Power Supplies)

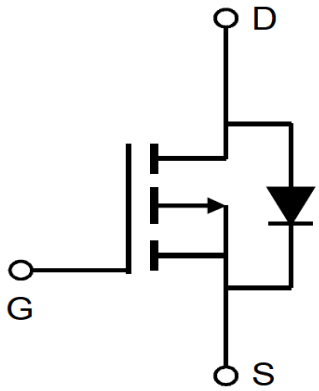
Product Summary

V_{DS}	-30V
$R_{DS(on)\ typ.}$	44mΩ
I_D	-4.2A

100% Avalanche Tested

RoHS HF





Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CR3401	3401	SOT23-3	Reel	N/A	N/A	3000pcs

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	 -4.2 -8.5 -2.7	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	-17	A
Avalanche energy, single pulse (L=0.3mH, Rg=25Ω)	E_{AS}	5.4	mJ
Gate-Source voltage	V_{GS}	±12	V
Power dissipation (T_C = 25°C)	P_{tot}	1.8	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

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Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – lead.	R_{thJL}	70	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	170	

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
Gate threshold voltage	$V_{GS(th)}$	-0.7		-1.6	V	V_{DS}=V_{GS},I_D=-250uA
Zero gate voltage drain current	I_{DSS}	- -	-0.05 -0.1	-1 -5	μA	V_{DS}=-30V,V_{GS}=0V T_j=25°C T_j=150°C
Gate-source leakage current	I_{GSS}	-	±10	±100	nA	V_{GS}=±12V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	- -	44 66 61	65 100 75	mΩ	V_{GS}=-10V, I_D=-5A, Tj=25°C Tj=150°C V_{GS}=-4.5V, I_D=-4A,
Transconductance	g_{fs}	-	10	-	S	V_{DS}=-5V,I_D=-5A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	492	-	pF	V_{GS}=0V, V_{DS}=-15V, f=1MHz
Output Capacitance	C_{oss}	-	64	-		
Reverse Transfer Capacitance	C_{rss}	-	55	-		
Gate Total Charge	Q_G	-	10.0	-	nC	V_{GS}=-10V, V_{DS}=-15V, I_D=-5A, f=1MHz
Gate-Source charge	Q_{gs}	-	2.1	-		
Gate-Drain charge	Q_{gd}	-	2.1	-		
Turn-on delay time	$t_{d(on)}$	-	6	-	ns	V_{GS}=-10V, V_{DD}=-15V, R_{G_ext}=2.7Ω,ID=-5A
Rise time	t_r	-	27	-		
Turn-off delay time	$t_{d(off)}$	-	16	-		
Fall time	t_f	-	30	-		
Gate resistance	R_G	-	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}	-	-0.9	-1.3	V	V_{GS}=0V,I_{SD}=-5A
Body Diode Continuous Forward Current	I_S			-4.7	A	T_C = 25°C
Body Diode Reverse Recovery Time	t_{rr}	-	11	-	ns	I_F=-5A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	4.2	-	nC	

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

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Typical Performance Characteristics

Fig 1: Output Characteristics

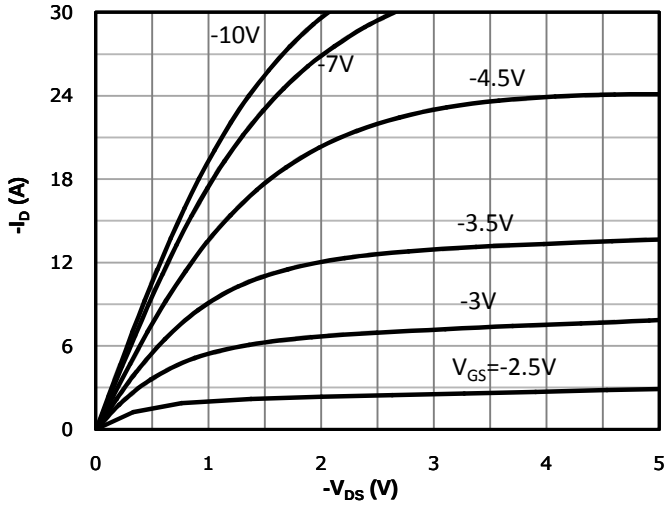


Fig 2: Transfer Characteristics

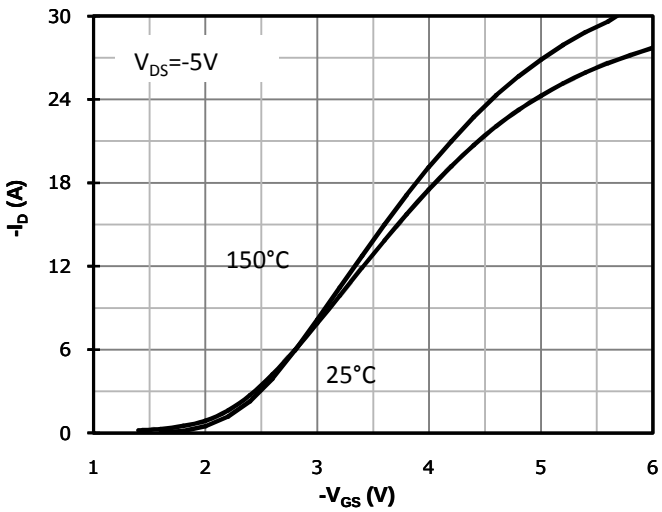


Fig 3: Rds(on) vs Drain Current and Gate Voltage

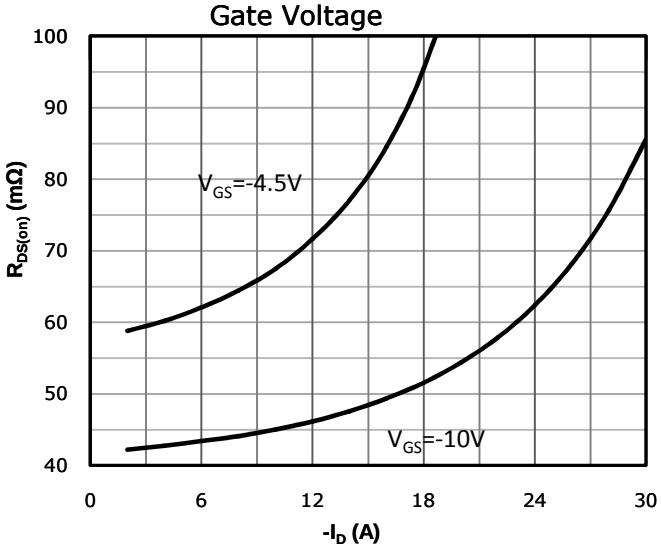


Fig 4: Rds(on) vs Gate Voltage

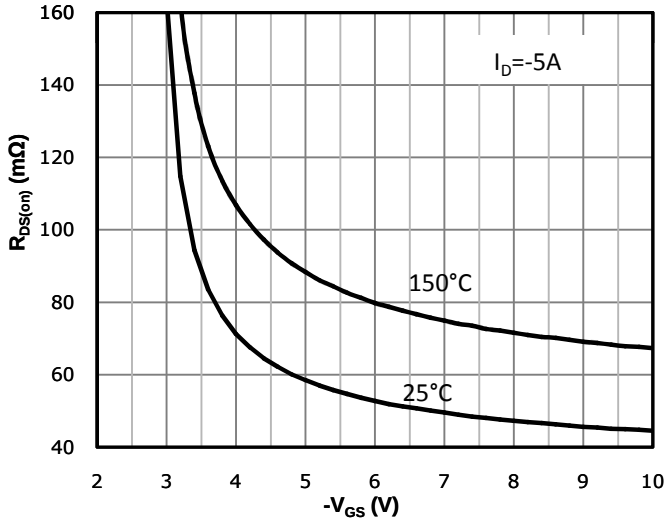


Fig 5: Rds(on) vs. Temperature

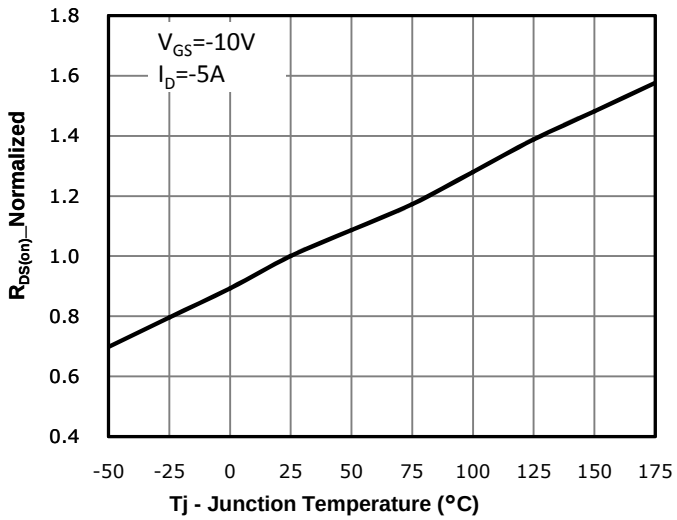
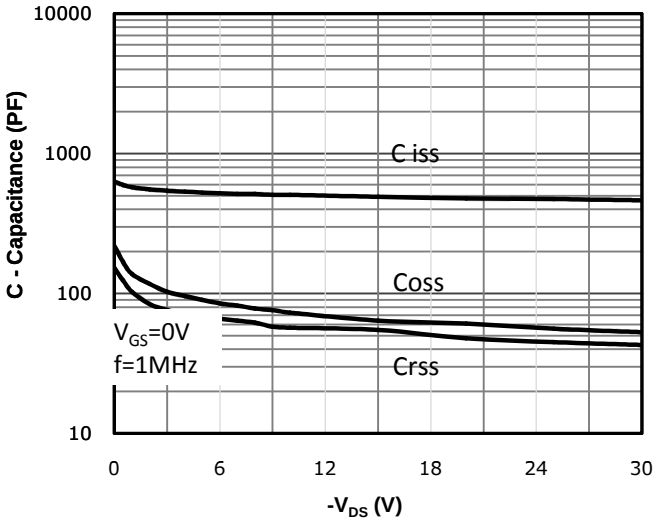


Fig 6: Capacitance Characteristics



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Fig 7: Gate Charge Characteristics

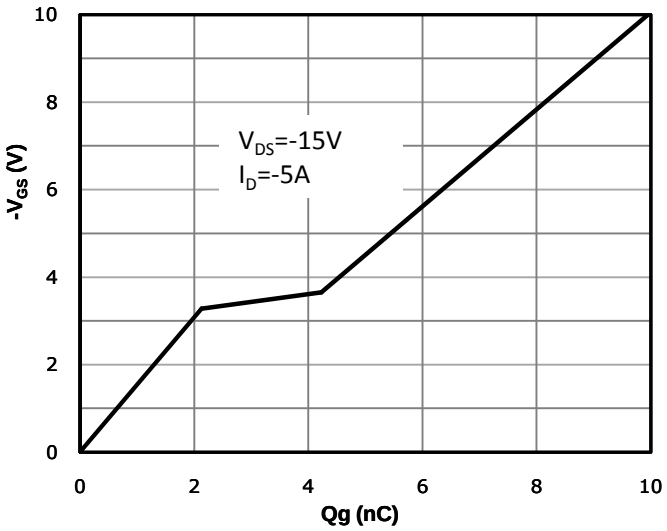


Fig 8: Body-diode Forward Characteristics

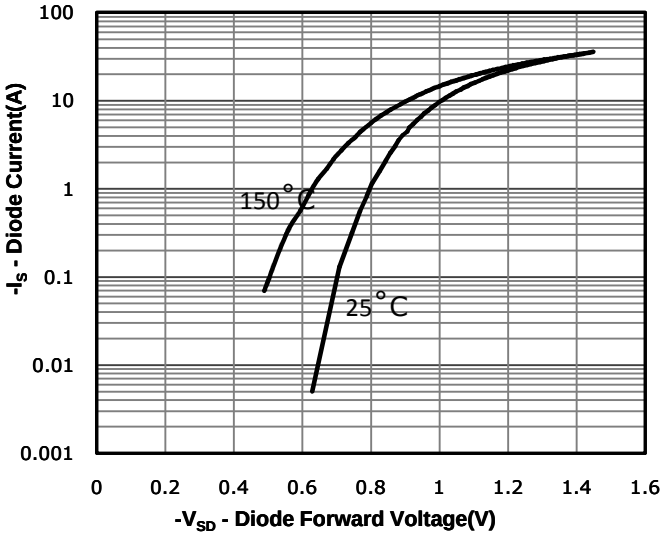


Fig 9: Power Dissipation

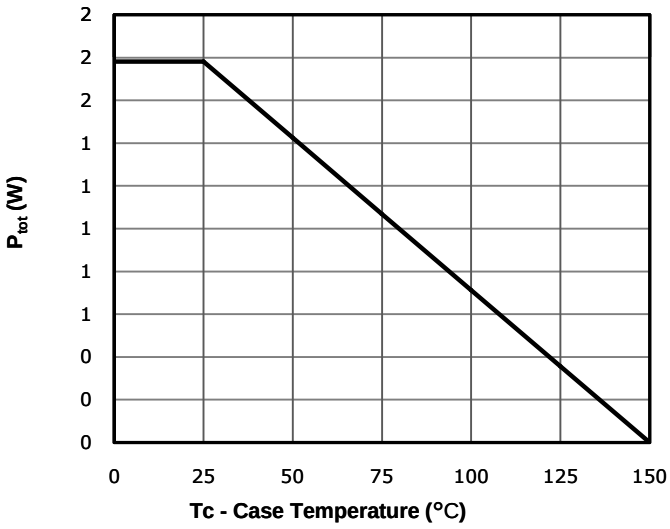


Fig 10: Drain Current Derating

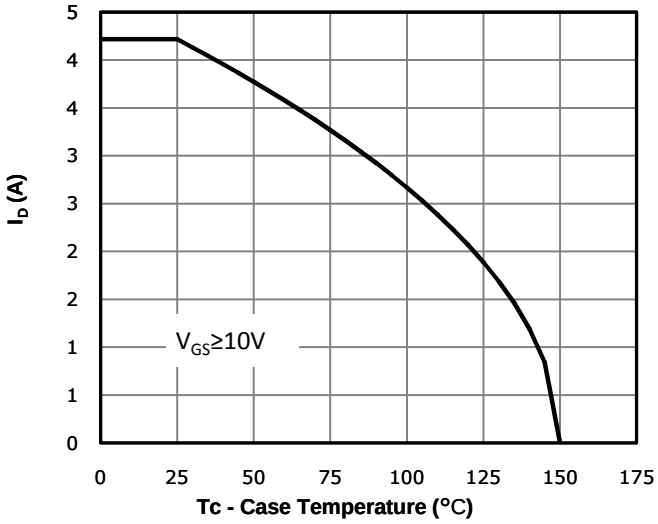
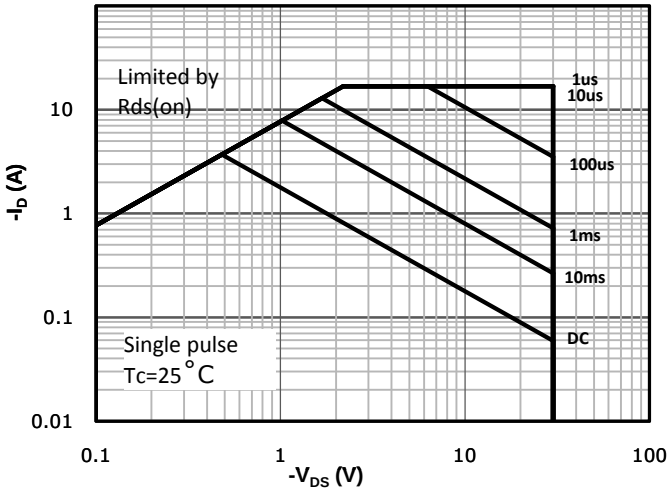
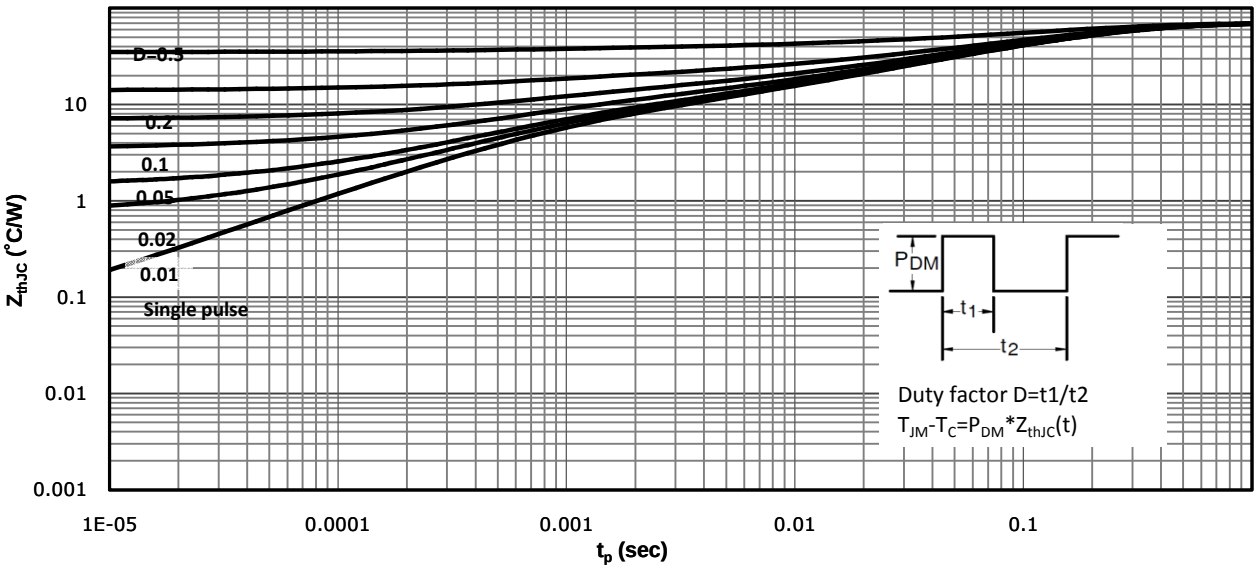


Fig 11: Safe Operating Area



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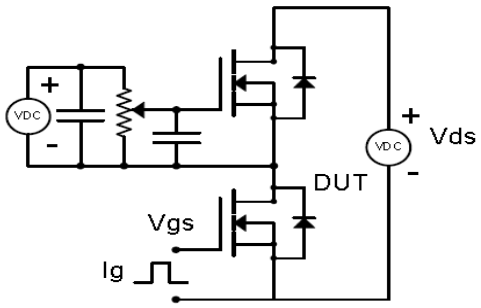
Fig 12: Max. Transient Thermal Impedance

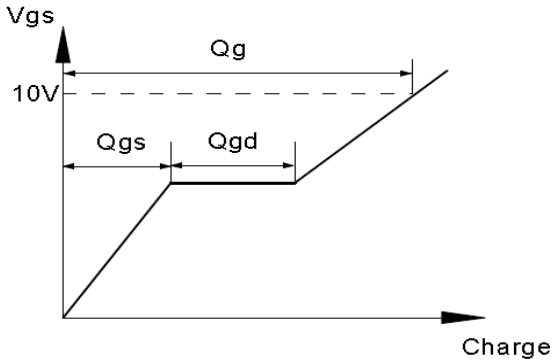


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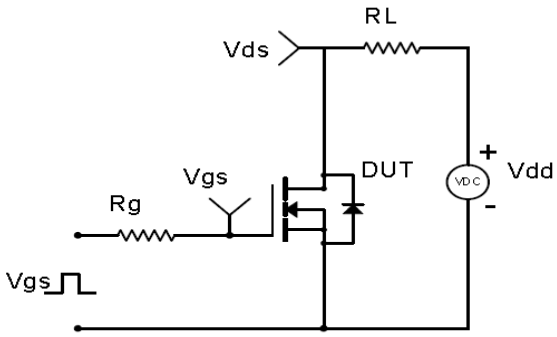
Test Circuit & Waveform

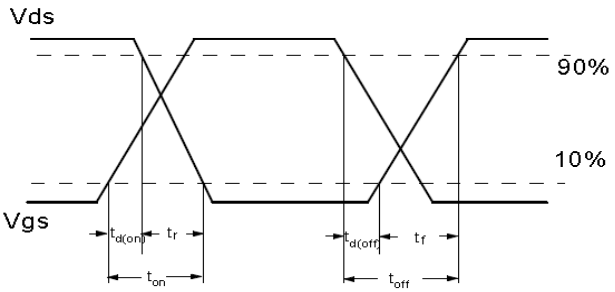
Gate Charge Test Circuit & Waveform



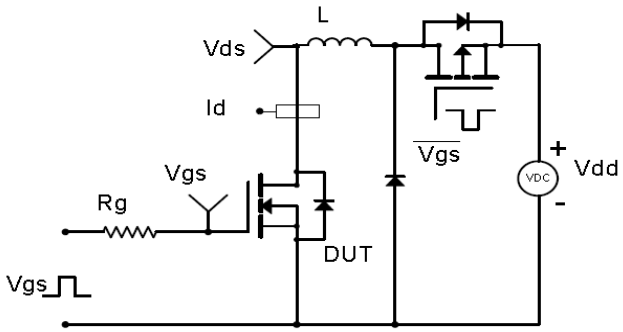


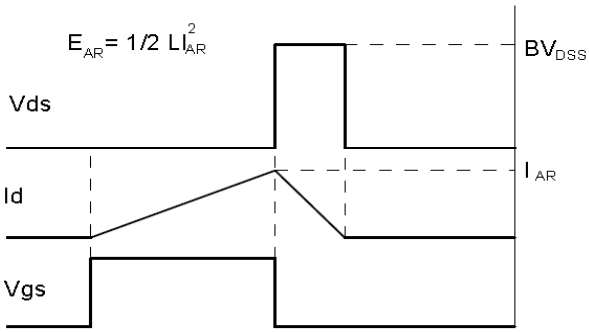
Resistive Switching Test Circuit & Waveforms



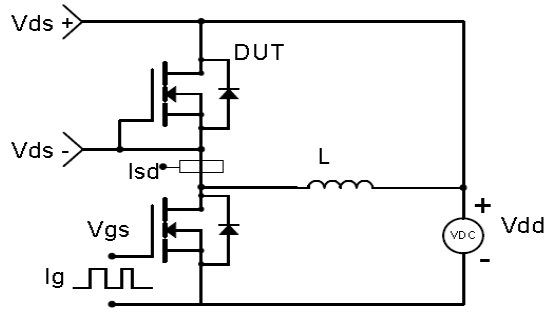


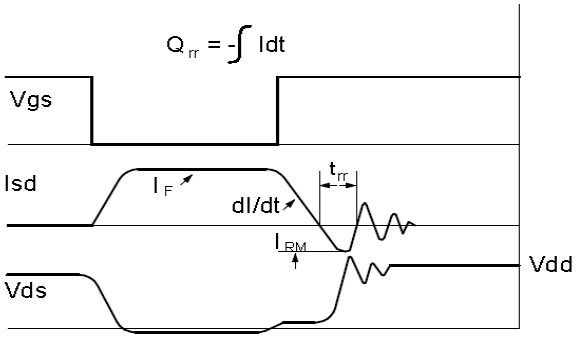
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





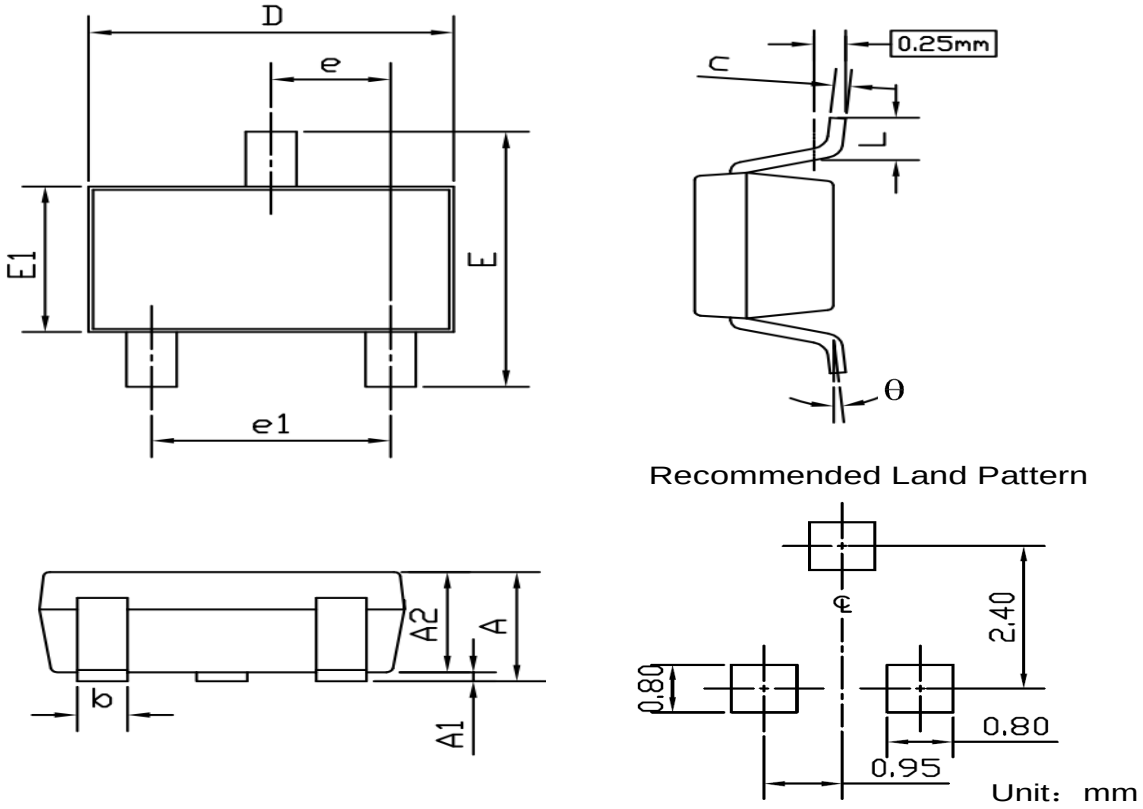
Diode Recovery Test Circuit & Waveforms





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Package Outline: SOT23-3



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.90	1.30	0.035	0.051
A1	0.00	0.15	0.000	0.006
A2	0.90	1.25	0.035	0.049
b	0.30	0.50	0.012	0.020
c	0.08	0.20	0.003	0.008
D	2.80	3.05	0.110	0.120
E	2.60	3.00	0.102	0.118
E1	1.50	1.75	0.059	0.069
e	0.95 BSC		0.037BSC	
e1	1.90 BSC		0.075 BSC	
L	0.30	0.60	0.012	0.024
θ	0°	8°	0°	8°

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Revision History

Revison	Date	Major changes
1.0	2021-3-29	Release of formal version

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.

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