华润微电子(重庆)有限公司

CRTE140P03L

TrenchMOS P-MOSFET -30V, 11mΩ, -12.9A

Features

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

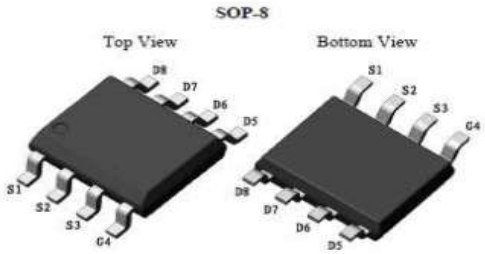
Product Summary

V_{DS}	-30V
$R_{DS(on).typ}$	11mΩ
I_D	-12.9A

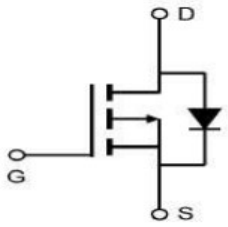
100% DVDS Tested
100% Avalanche Tested

Applications

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



CRTE140P03L



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRTE140P03L	TE140P03L	SOP-8	REEL	N/A	N/A	4000pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	-30	V
Continuous drain current T_A = 25°C (Silicon limit) T_A = 25°C (Package limit) T_A = 100°C (Silicon limit)	I_D	 -12.9 -30 -8	A
Pulsed drain current (T_A = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	-52	A
Avalanche energy, single pulse (I_D = 24A, Rg=25Ω)[1]	E_{AS}	144	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_A = 25°C)	P_{tot}	3.1	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 =24A, VGS = - 10V.

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Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – Lead.	R_{thJL}	20.8	°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}	-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	$R_{DS(on)}$	- -	11.0 16.0	14.0 25.0	mΩ	VGS=-10V, ID=-14A VGS=-4.5V, ID=-10A
Transconductance	g_{fs}	-	35	-	S	V_{DS}=-5V, I_D=-14A
Dynamic Characteristic						
Input Capacitance	C_{iss}	1363	2044	3066	pF	V_{GS}=0V, V_{DS}=-15V, f=1MHz
Output Capacitance	C_{oss}	217	326	488		
Reverse Transfer Capacitance	C_{rss}	105	209	418		
Gate Total Charge	Q_G	24	36	55	nC	V_{GS}=-10V, V_{DS}=-15V, I_D=-22A
Gate-Source charge	Q_{gs}	6	9	14		
Gate-Drain charge	Q_{gd}	4	7	14		
Turn-on delay time	$t_{d(on)}$	5	11	21	ns	V_{GS}=-10V, V_{DD}=-15V, R_{G_ext}=2.7Ω, ID=-22A
Rise time	t_r	56	85	127		
Turn-off delay time	$t_{d(off)}$	22	33	50		
Fall time	t_f	67	101	152		
Gate resistance	R_G	2	9	45	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	1.4	V	V_{GS}=0V,I_{SD}=-14A
Body Diode Continuous Forward Current	Is	-	-	-12.9	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}	-	5	-	nC	

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Typical Performance Characteristics

Fig 1: Output Characteristics

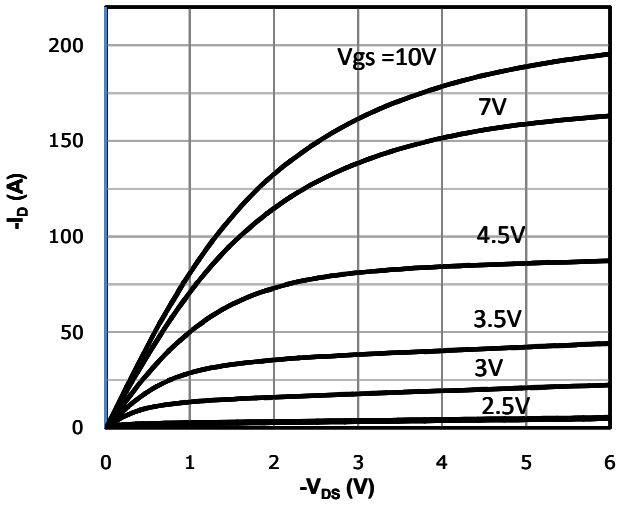


Fig 2: Transfer Characteristics

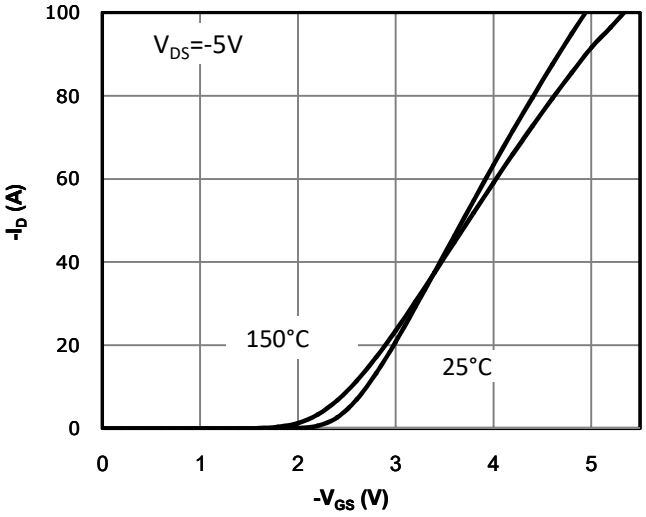


Fig 3: Rds(on) vs Drain Current and Gate Voltage

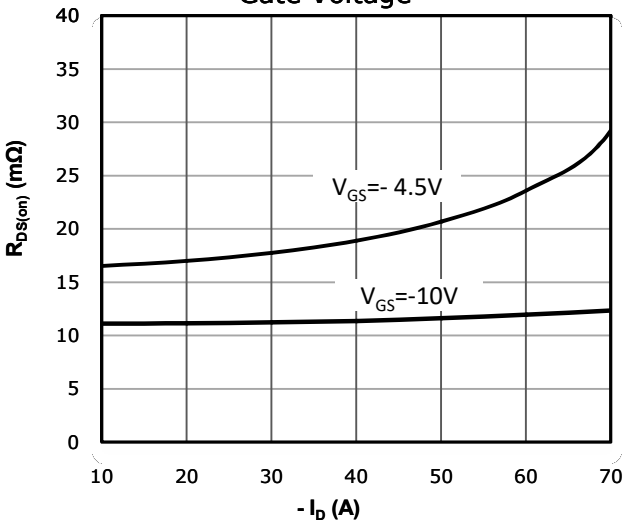


Fig 4: Rds(on) vs Gate Voltage

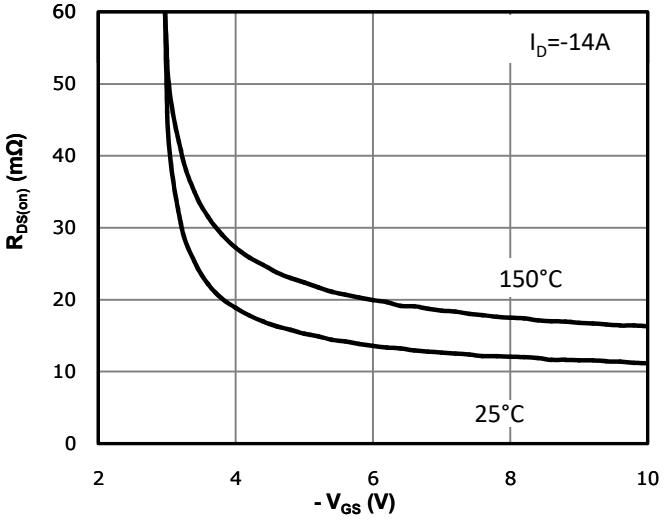


Fig 5: Rds(on) vs. Temperature

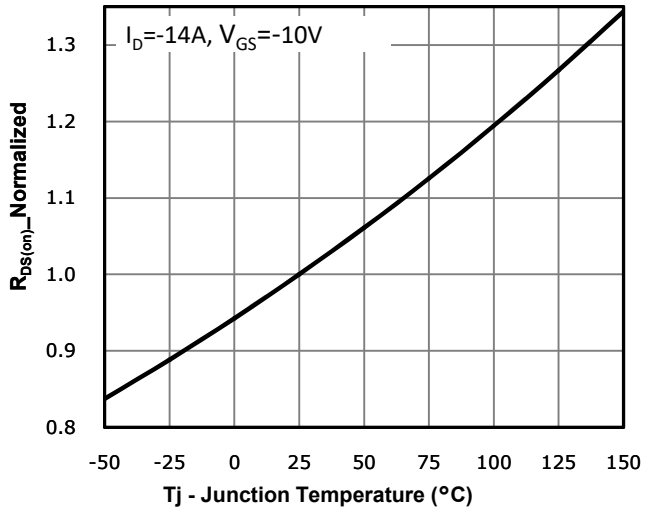
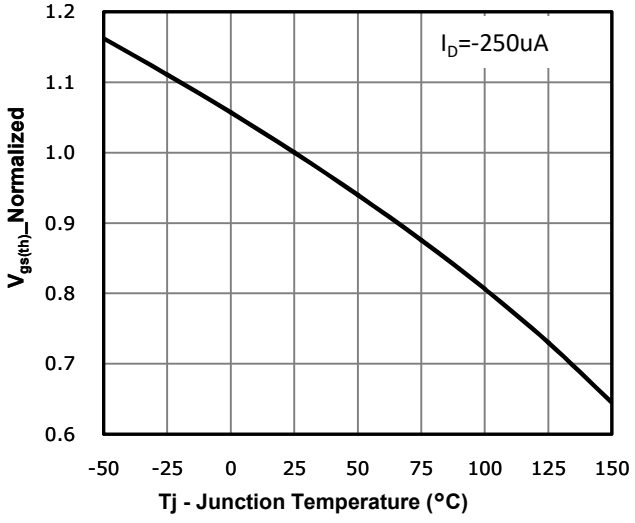


Fig 6: Vgs(th) vs. Temperature



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Fig 7: BVdss vs. Temperature

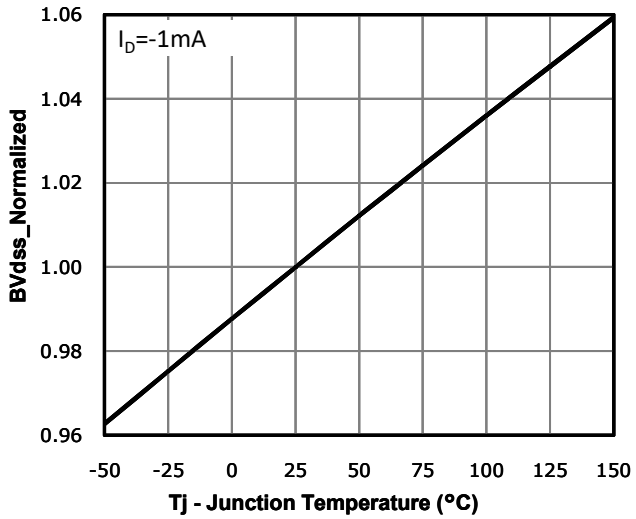


Fig 8: Capacitance Characteristics

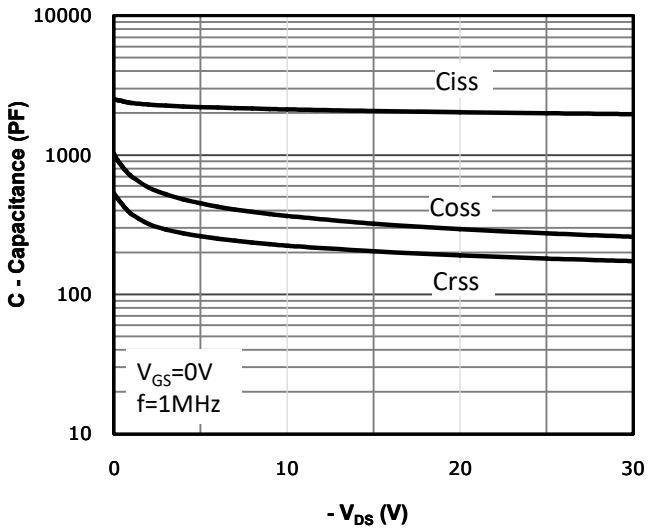


Fig 9: Gate Charge Characteristics

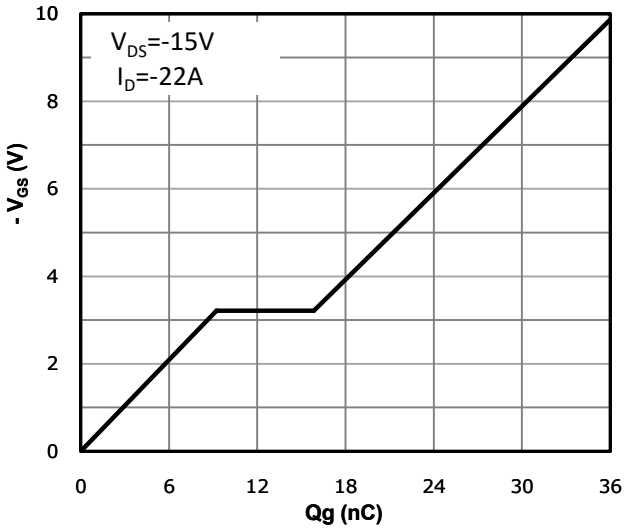


Fig 10: Body-diode Forward Characteristics

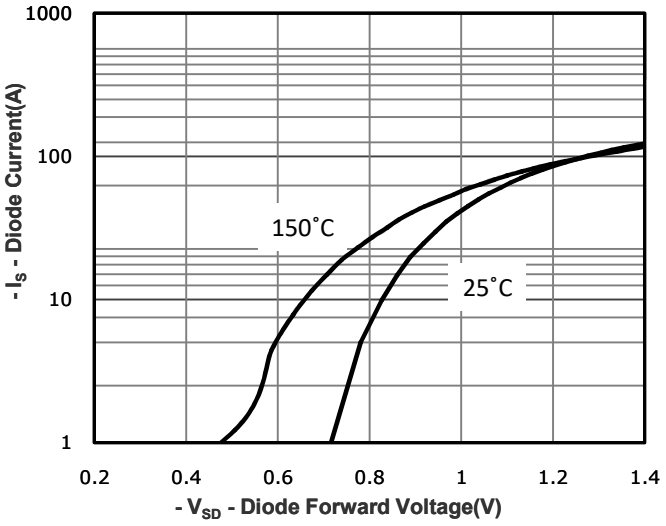


Fig 11: Power Dissipation

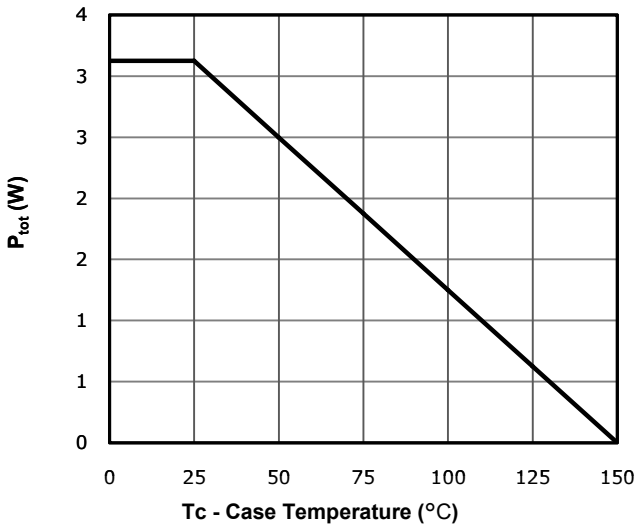
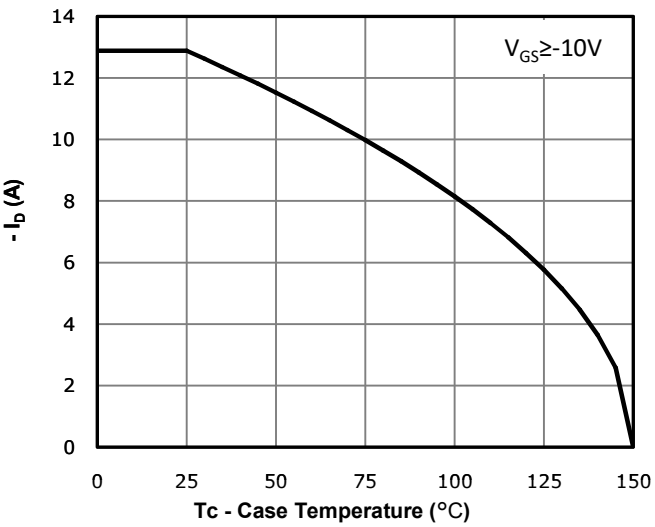


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

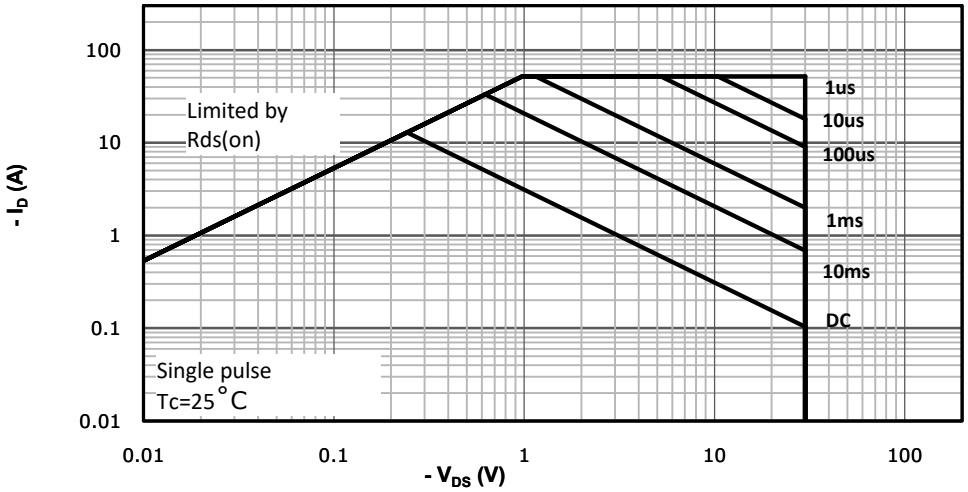
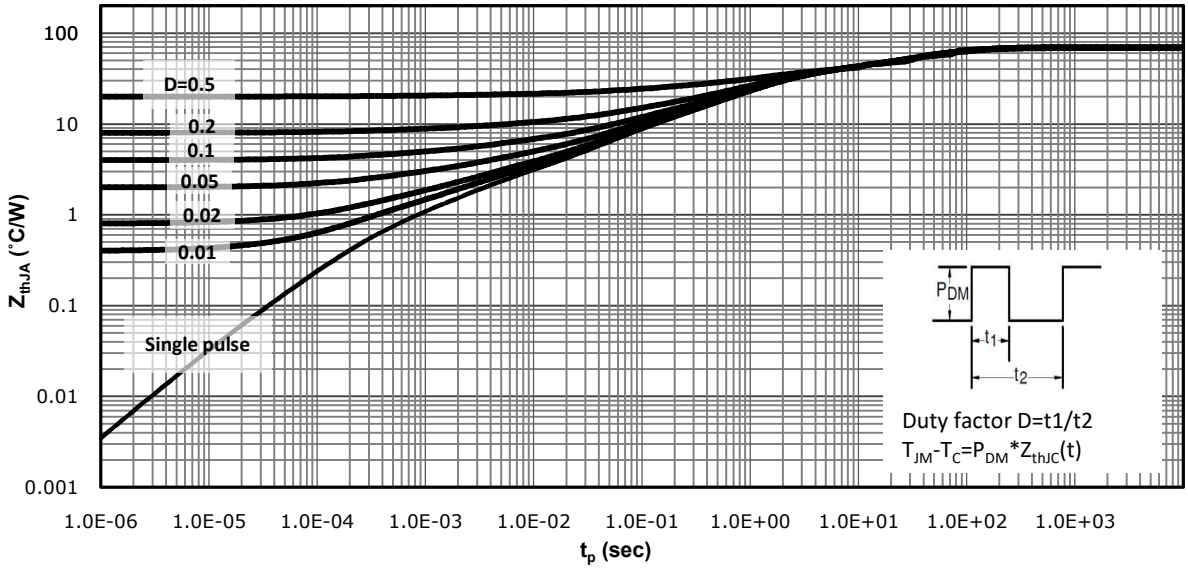


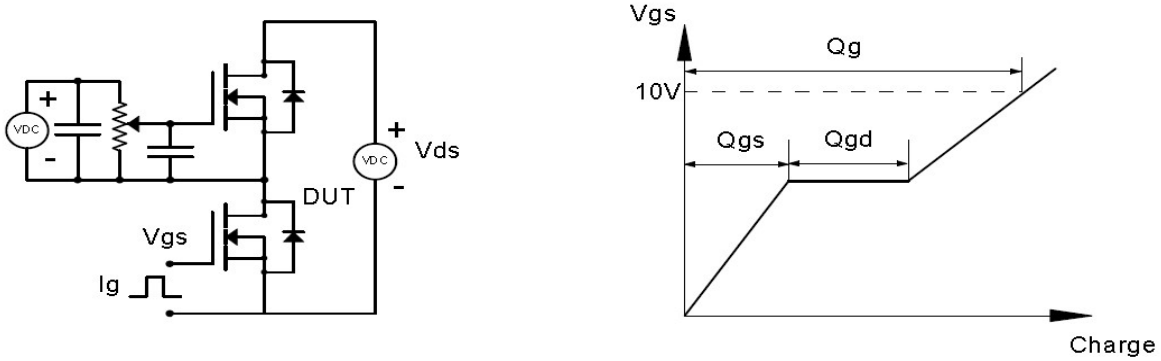
Fig 14: Max. Transient Thermal Impedance



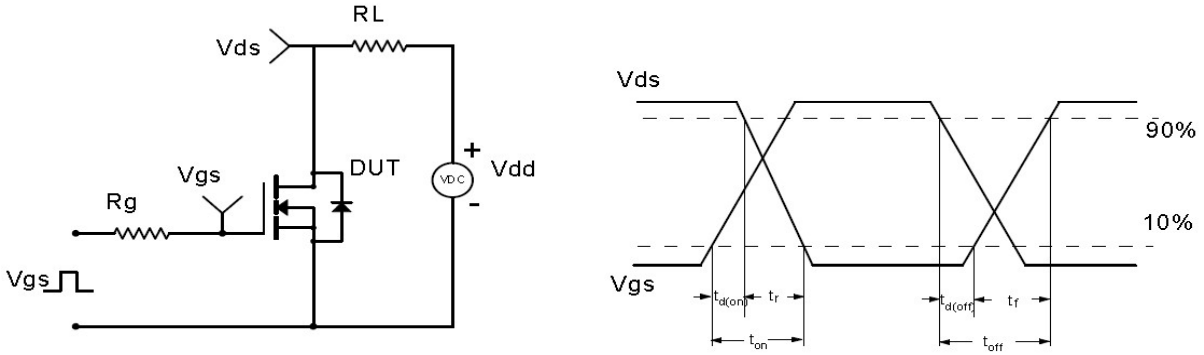
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Test Circuit & Waveform

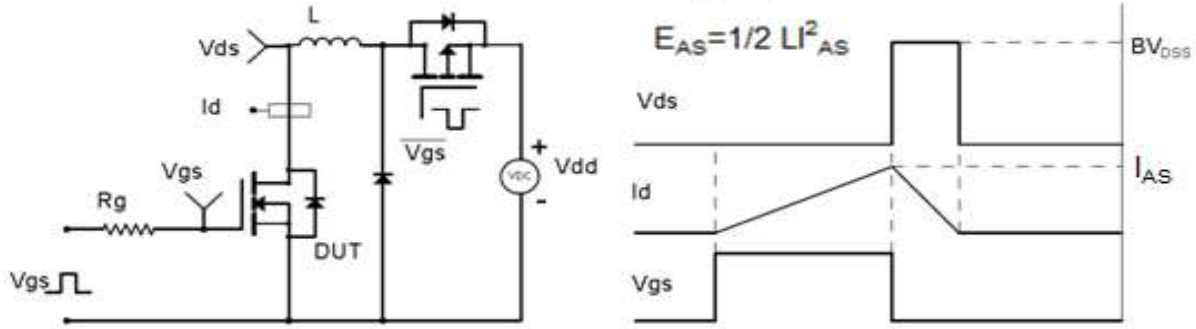
Gate Charge Test Circuit & Waveform



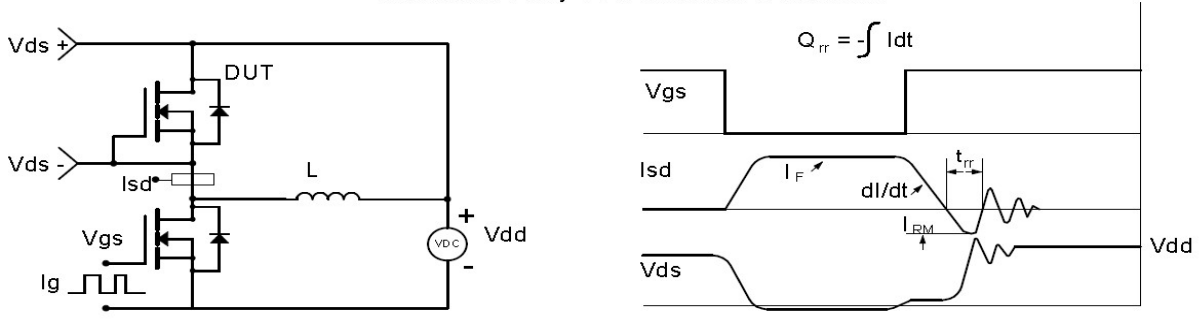
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

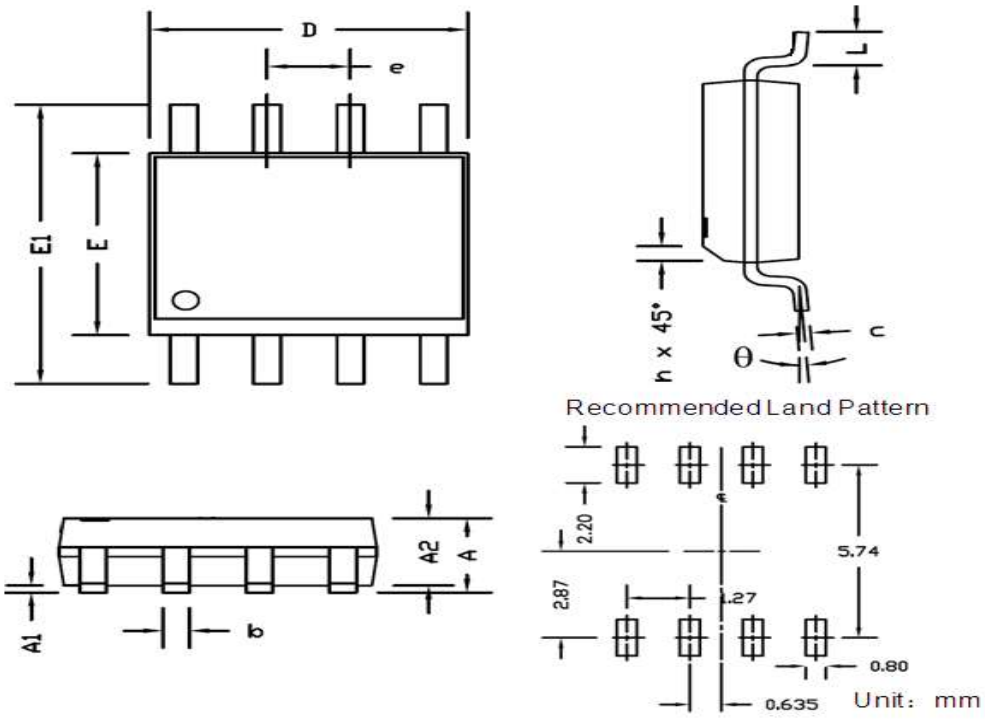


Diode Recovery Test Circuit & Waveforms



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Package Outline: SOP-8L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	1.65	0.049	0.065
b	0.33	0.51	0.013	0.020
c	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
e	1.27 BSC.		0.050 BSC.	
E	3.80	4.00	0.150	0.157
E1	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.020
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

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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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