CRST020N06N4Z

SkyMOS4 N-MOSFET 60V, 1.8mΩ, 180A

Features

- Uses CRM(CQ) advanced SkyMOS4 technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g x R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria

Product Summary

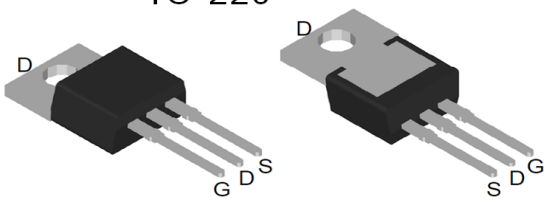
V_{DS}	60V
$R_{DS(on).typ}$	1.8mΩ
I_D	180A

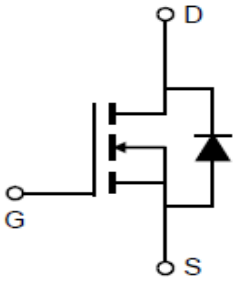
100% DVDS Tested
100% Avalanche Tested

Applications

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

TO-220





CRST020N06N4Z

Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRST020N06N4Z	CRST020N06N4Z	TO-220	Tube	N/A	N/A	50pcs

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	 220 180 136	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	720	A
Avalanche energy, single pulse (I_D = 55A, Rg=25Ω)[1]	E_{AS}	756	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	173	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 =55A, 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}	0.72	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	62	

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}	65	-	-	V	V_{GS}=0V, I_D=250μA
Gate threshold voltage	$V_{GS(th)}$	2.0	-	3.4	V	V_{DS}=V_{GS},I_D=250μA
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}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	1.8	2.3	mΩ	VGS=10V, ID=50A
Transconductance	g_{fs}	-	184.0	-	S	V_{DS}=5V, I_D=50A
Dynamic Characteristic						
Input Capacitance	C_{iss}	3509	7018	10527	pF	V_{GS}=0V, V_{DS}=30V, f=1MHz
Output Capacitance	C_{oss}	1118	2237	3355		
Reverse Transfer Capacitance	C_{rss}	40	81	161		
Gate Total Charge	Q_G	52	104.4	156	nC	V_{GS}=10V, V_{DS}=30V, I_D=50A
Gate-Source charge	Q_{gs}	20	40.2	60		
Gate-Drain charge	Q_{gd}	6	13.1	26		
Turn-on delay time	$t_{d(on)}$	9	19.7	39	ns	V_{GS}=10V, V_{DD}=30V, R_{G_ext}=2.7Ω,ID=50A
Rise time	t_r	18	37.1	55		
Turn-off delay time	$t_{d(off)}$	28	57.2	85		
Fall time	t_f	14	28.7	43		
Gate resistance	R_G	-	1.8	4	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}	-	0.86	1.4	V	V_{GS}=0V,I_{SD}=50A
Body Diode Reverse Recovery Time	t_{rr}	-	71.4	-	ns	I_F=50A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	89.7	-	nC	

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Typical Performance Characteristics

Fig 1: Output Characteristics

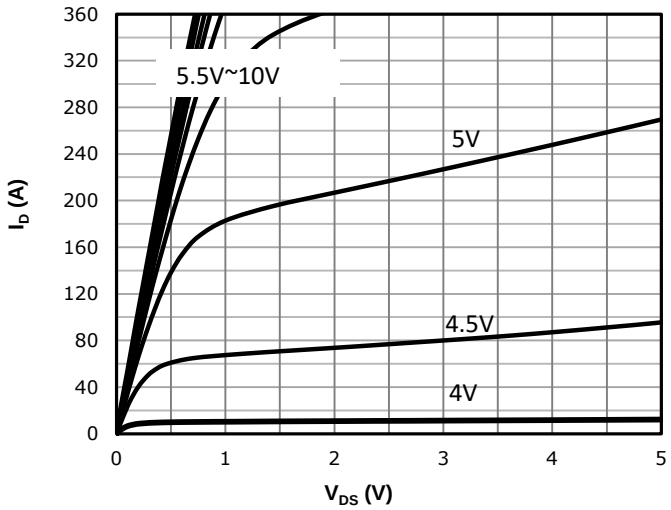


Fig 2: Transfer Characteristics

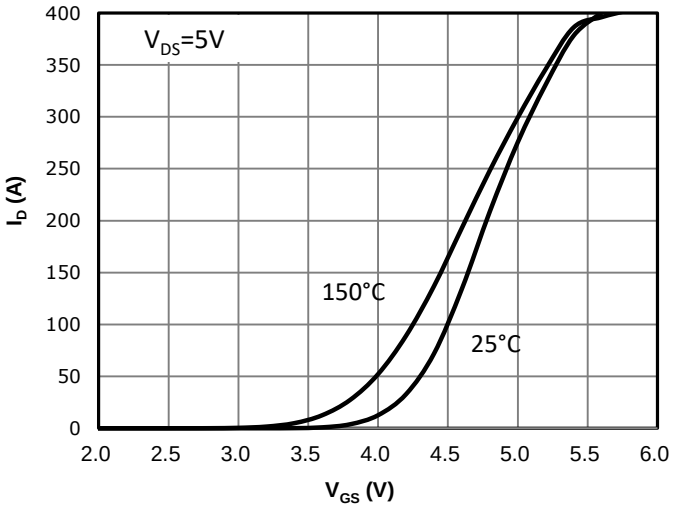


Fig 3: Rds(on) vs Drain Current and Gate Voltage

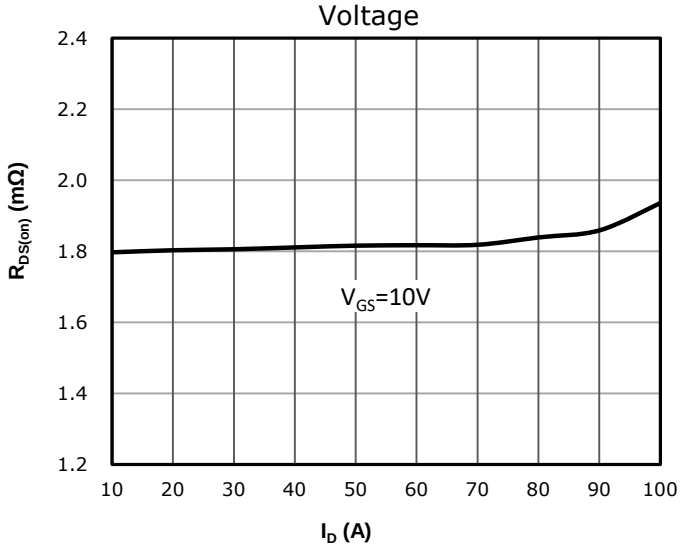


Fig 4: Rds(on) vs Gate Voltage

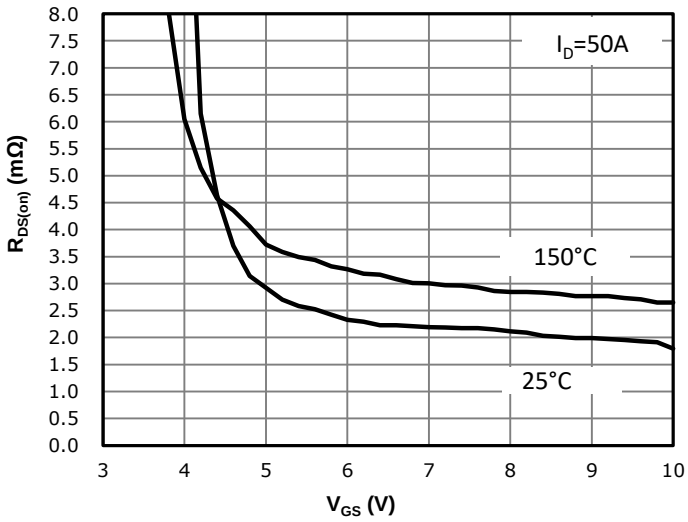


Fig 5: Rds(on) vs. Temperature

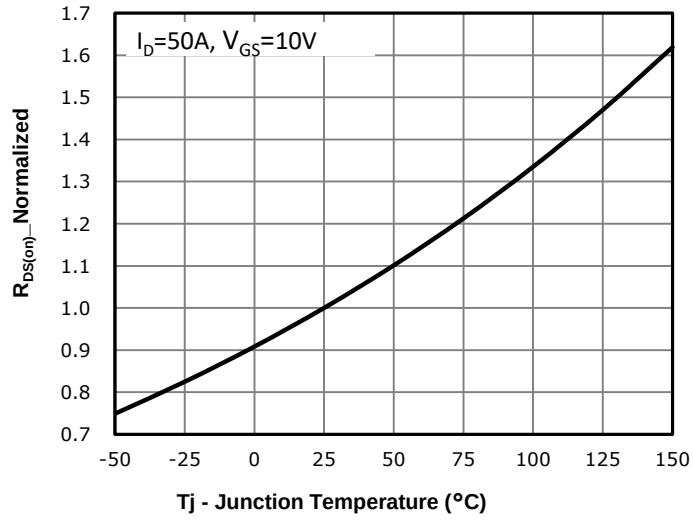
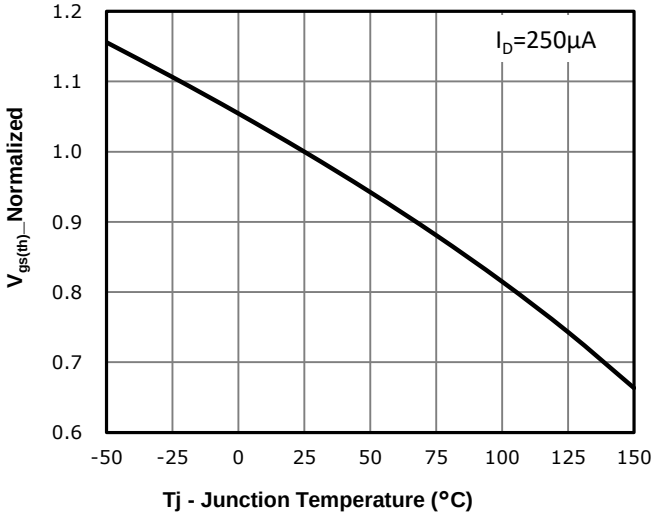


Fig 6: Vgs(th) vs. Temperature



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Fig 7: BVdss vs. Temperature

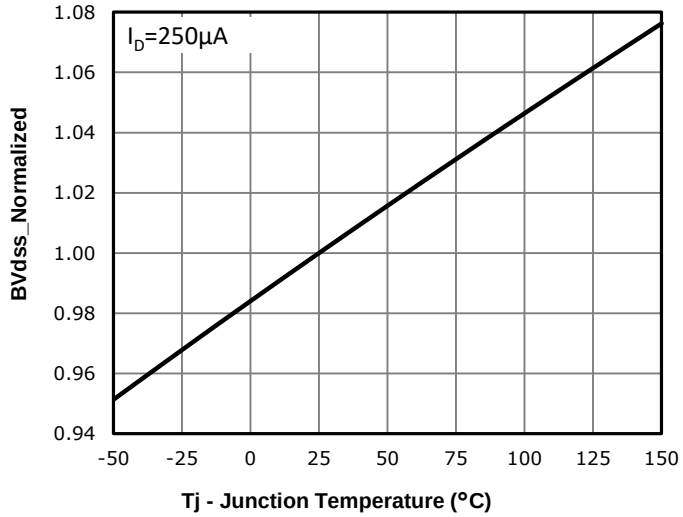


Fig 8: Capacitance Characteristics

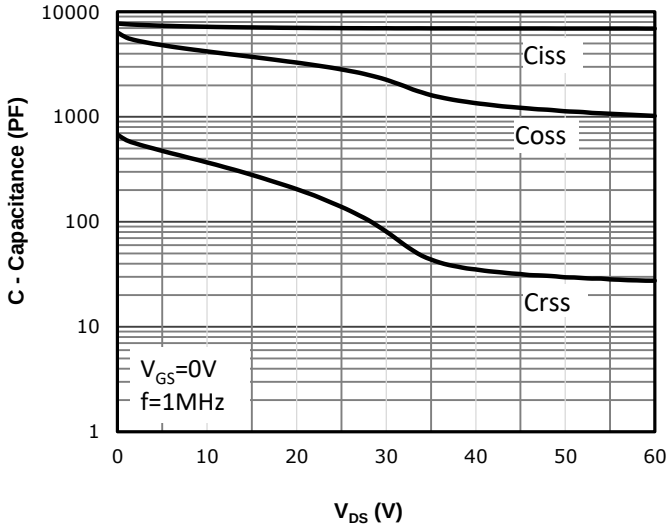


Fig 9: Gate Charge Characteristics

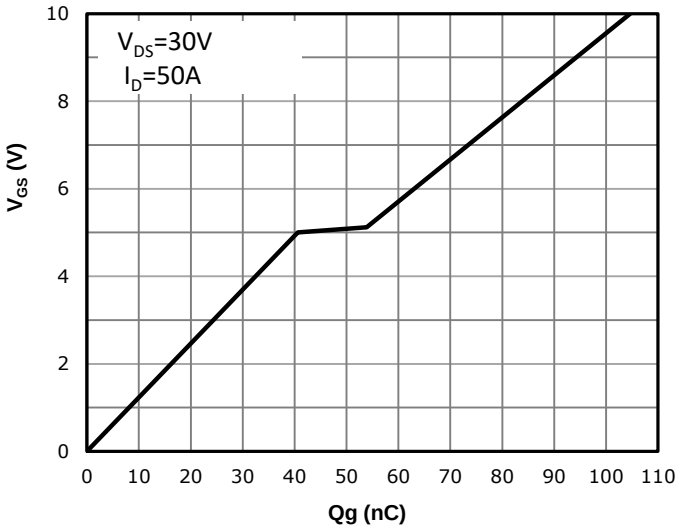


Fig 10: Body-diode Forward Characteristics

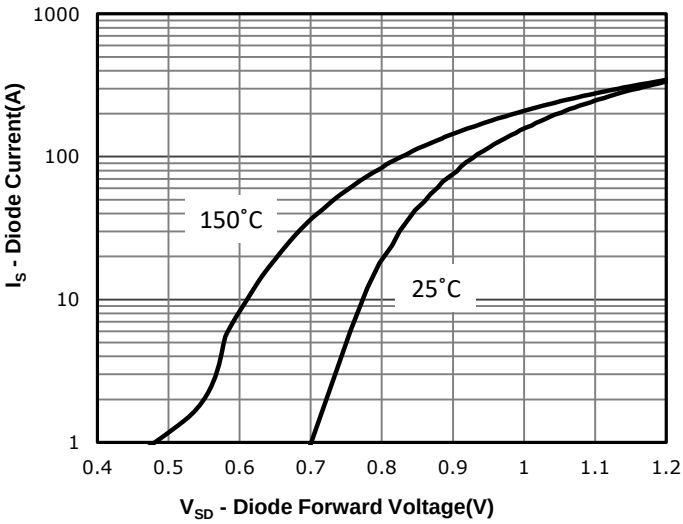


Fig 11: Power Dissipation

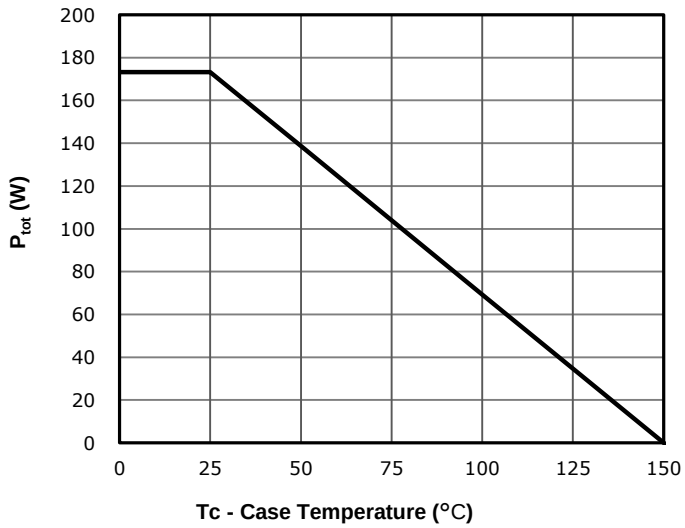
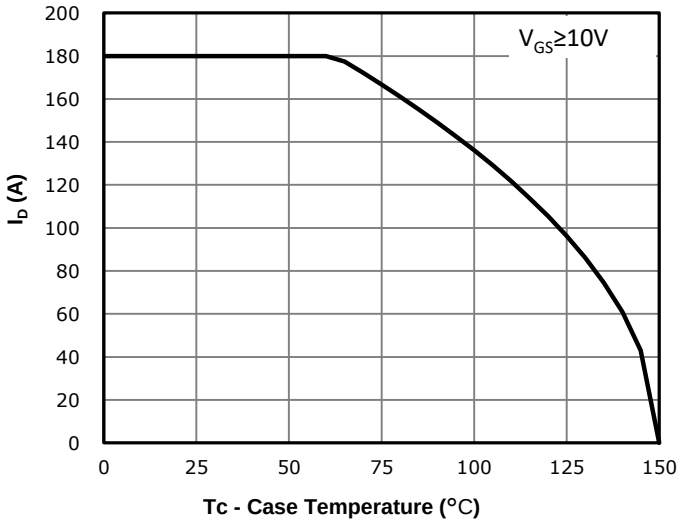


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

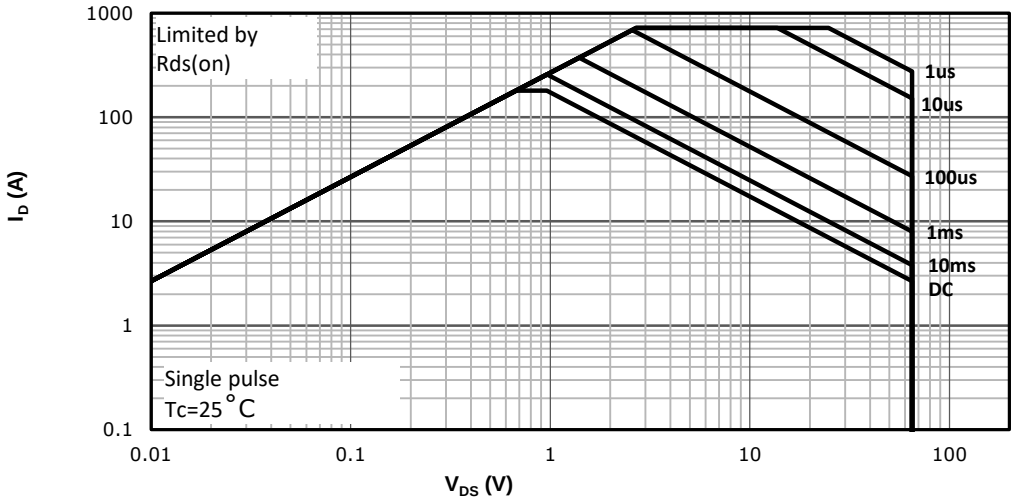
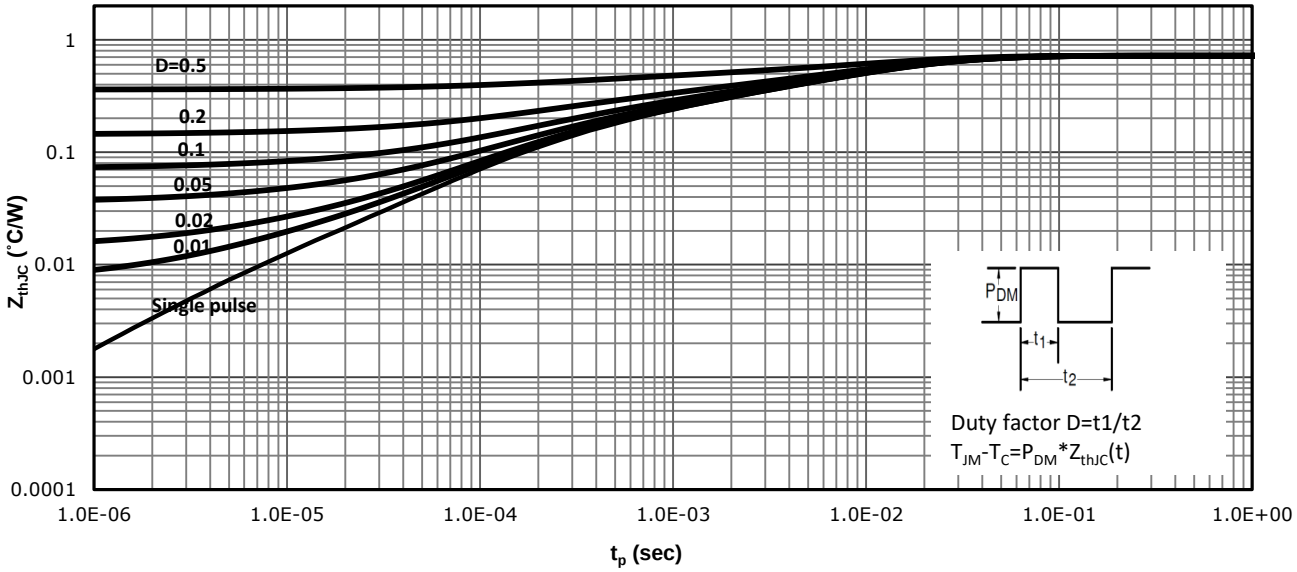


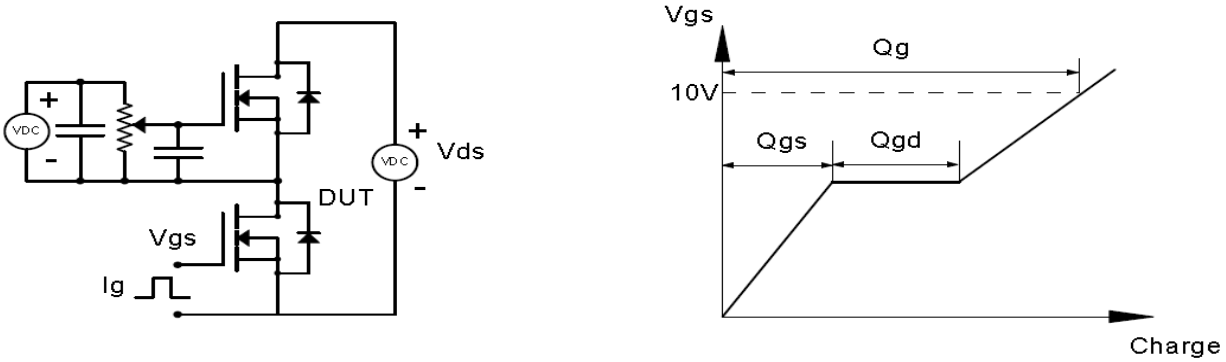
Fig 14: Max. Transient Thermal Impedance



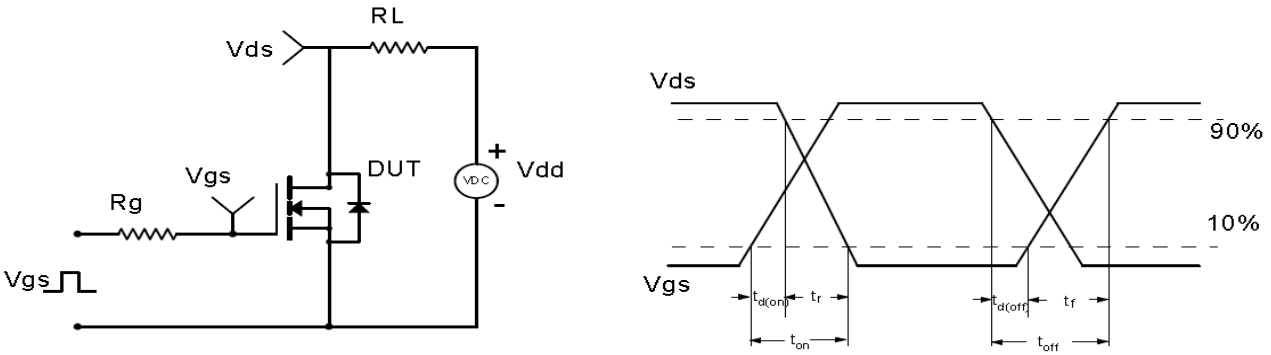
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Test Circuit & Waveform

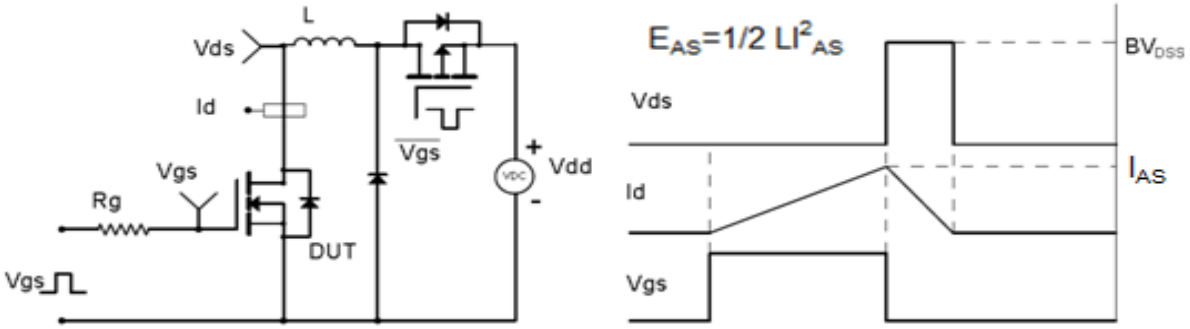
Gate Charge Test Circuit & Waveform



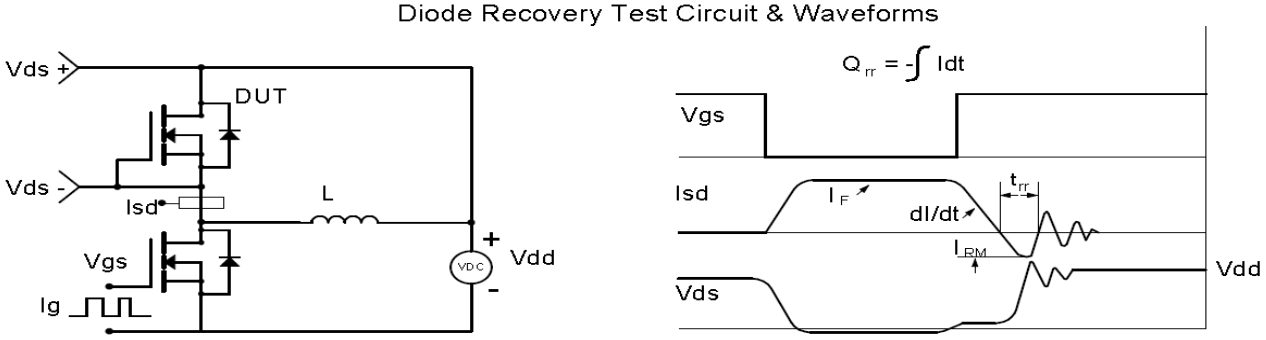
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

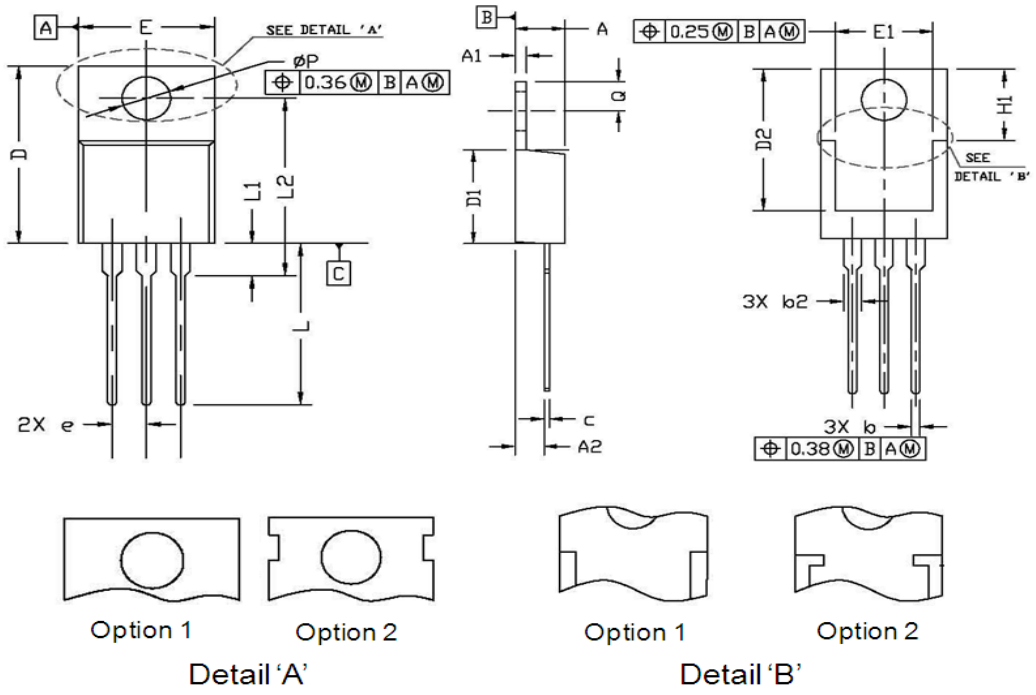


Diode Recovery Test Circuit & Waveforms



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Package Outline: TO-220



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.30	4.80	0.169	0.189
A1	1.20	1.44	0.047	0.057
A2	2.20	2.90	0.087	0.114
b	0.69	0.95	0.027	0.037
b2	1.00	1.60	0.039	0.063
c	0.33	0.65	0.013	0.026
D	14.70	16.20	0.579	0.638
D1	8.59	9.65	0.338	0.380
D2	11.75	13.60	0.463	0.535
e	2.54 BSC.		0.100 BSC.	
E	9.60	10.60	0.378	0.417
E1	7.00	8.90	0.276	0.350
H1	6.00	7.00	0.236	0.276
L	12.60	14.80	0.496	0.583
L1	2.50	3.90	0.098	0.154
L2	12.13	16.50	0.478	0.650
Q	2.40	3.10	0.094	0.122
P	3.50	3.95	0.138	0.156

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Marking



NOTE:
NXBBAAAAY

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	2024/8/3	Release of Preliminary version.
2.0	2024/11/9	Add Continuous drain current limited by Package; update Fall time.

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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