

Features

- Uses CRM(CQ) advanced SkyMOS3 technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria

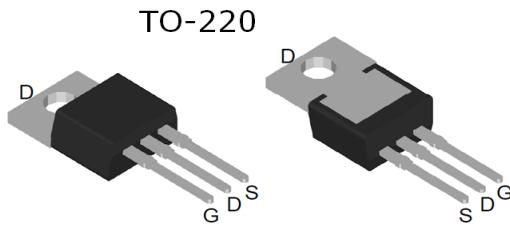
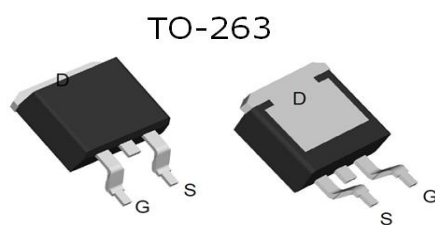
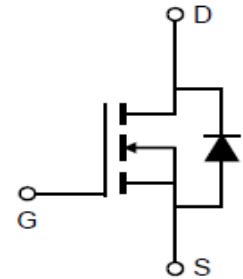
Applications

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

Product Summary

V_{DS}	150V
$R_{DS(on)}$	4mΩ
I_D	160A

100% DVDS Tested
100% Avalanche Tested


CRST052N15N3Z

CRSS049N15N3Z

Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRST052N15N3Z	CRST052N15N3Z	TO-220	Tube	N/A	N/A	50pcs
CRSS049N15N3Z	CRSS049N15N3Z	TO-263	Tape	N/A	N/A	1000pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	150	V
Continuous drain current $T_C = 25^\circ\text{C}$ (Silicon limit) $T_C = 25^\circ\text{C}$ (Package limit) $T_C = 100^\circ\text{C}$ (Silicon limit)	I_D	168 160 106	A
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D\ pulse}$	640	A
Avalanche energy, single pulse ($I_D = 70\text{A}$, $R_g = 25\Omega$) ^[1]	E_{AS}	1225	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation ($T_C = 25^\circ\text{C}$)	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)	T_{sold}	260	°C

※. Notes: 1. E_{AS} is tested at starting $T_j = 25^\circ\text{C}$, $L = 0.5\text{mH}$, $I_{AS} = 70\text{A}$, $V_{GS} = 10\text{V}$.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	0.44	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	62	

Electrical Characteristic (at $T_j = 25\text{ }^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

Static Characteristic

Drain-source breakdown voltage	BV_{DSS}	150	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Drain-source breakdown voltage	BV_{DSS}	150	-	-	V	$V_{GS}=0V, I_D=1mA$
Gate threshold voltage	$V_{GS(th)}$	2.0	3.0	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=120V, V_{GS}=0V$ $T_j=25^\circ C$ $T_j=125^\circ C$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	4.0	5.2	$m\Omega$	$V_{GS}=10V, I_D=80A$ TO-220
		-	3.8	4.9	$m\Omega$	TO-263
		-	4.4	5.5	$m\Omega$	$V_{GS}=8V, I_D=64A$ TO-220
		-	4.1	5.1	$m\Omega$	TO-263
Transconductance	g_{fs}	62.3	124.6	249.2	S	$V_{DS}=5V, I_D=80A$

Dynamic Characteristic

Input Capacitance	C_{iss}	3397.3	5096	7644	pF	$V_{GS}=0V, V_{DS}=75V,$ $f=1MHz$
Output Capacitance	C_{oss}	484	726	1089		
Reverse Transfer Capacitance	C_{rss}	15.7	23.6	35.4		
Gate Total Charge	Q_G	49.2	73.8	110.7	nC	$V_{GS}=10V, V_{DS}=75V,$ $I_D=80A, f=1MHz$
Gate-Source charge	Q_{gs}	19.3	28.9	43.4		
Gate-Drain charge	Q_{gd}	10.4	15.6	23.4		

Turn-on delay time	$t_{d(on)}$	13.3	20.0	30.0	ns	V _{ds} =75V I _d =80A R _g =2.7Ω V _{gs} =10V;
Rise time	t_r	65.6	98.4	147.6		
Turn-off delay time	$t_{d(off)}$	39.7	59.6	89.4		
Fall time	t_f	67.9	101.8	152.7		
Gate resistance	R _G	-	3.5	-	Ω	V _{GS} =0V, V _{DS} =0V, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V _{SD}	-	0.9	1.4	V	V _{GS} =0V, I _{SD} =80A
Body Diode Reverse Recovery Time	t_{rr}	-	95.7	-	ns	I _{SD} =80A, V _{GS} =0V, dI _F /dt=100A/us;
Body Diode Reverse Recovery Charge	Q _{rr}	-	313.2	-	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

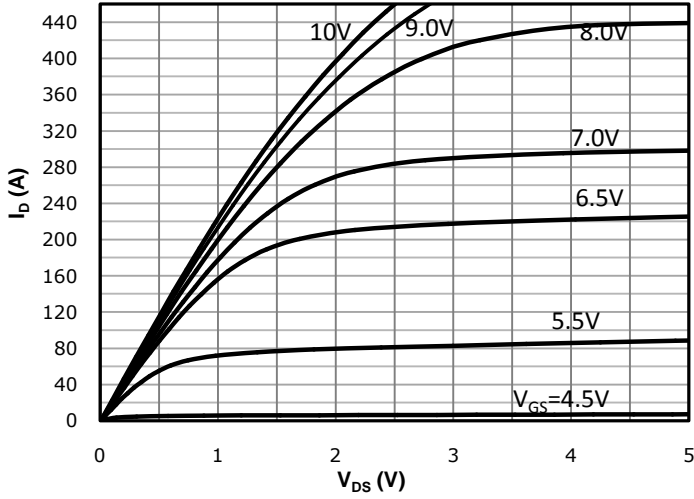


Fig 2: Transfer Characteristics

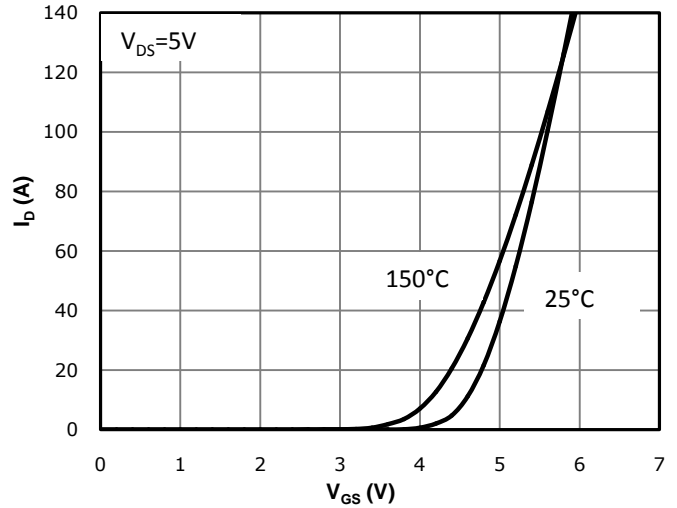


Fig 3: Rds(on) vs Drain Current and Gate Voltage

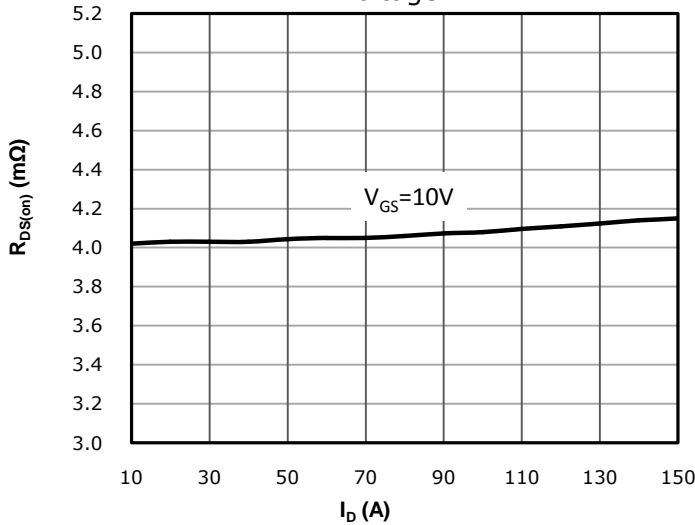


Fig 4: Rds(on) vs Gate Voltage

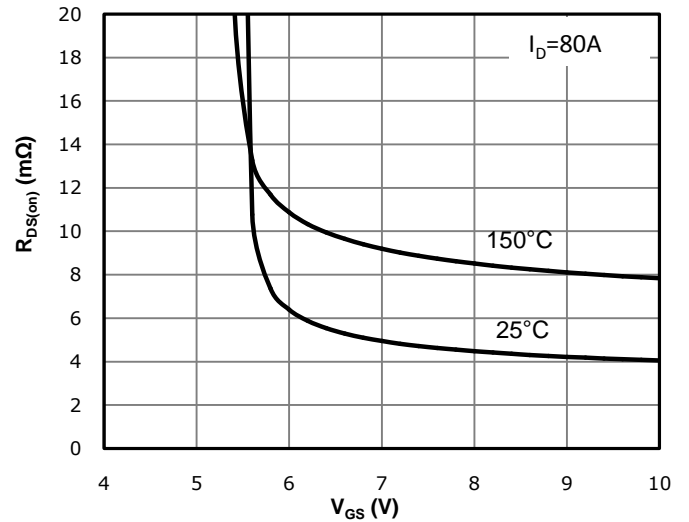


Fig 5: Rds(on) vs. Temperature

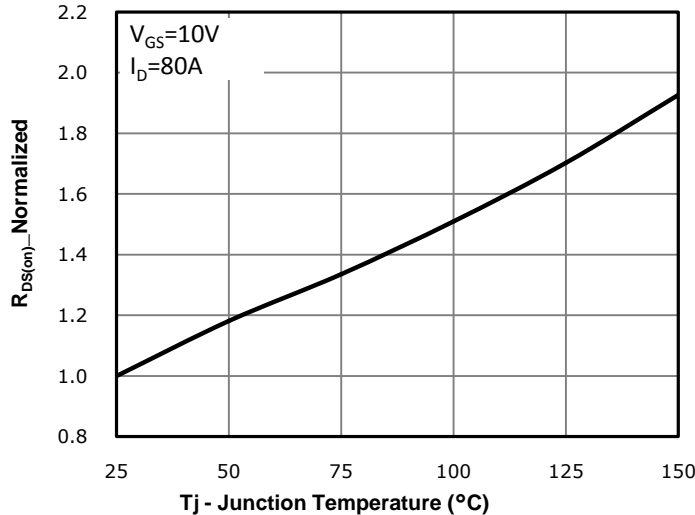
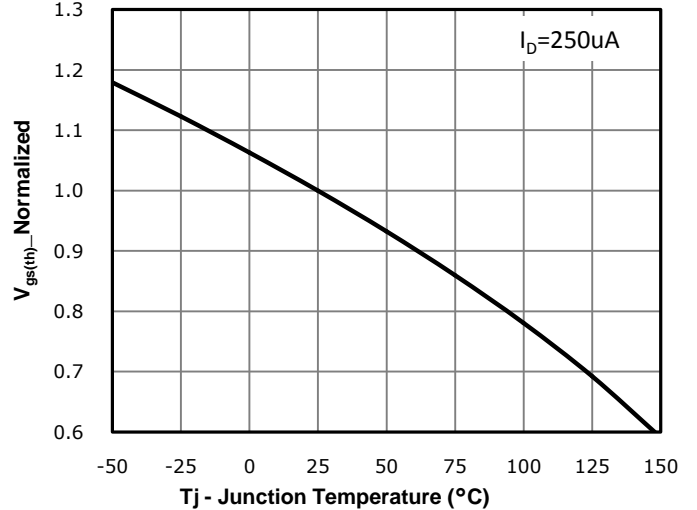


Fig 6: Vgs(th) vs. Temperature



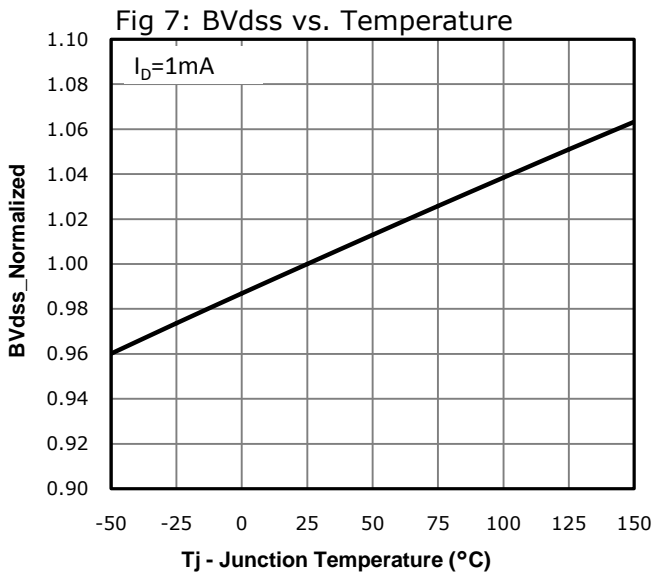


Fig 9: Gate Charge Characteristics

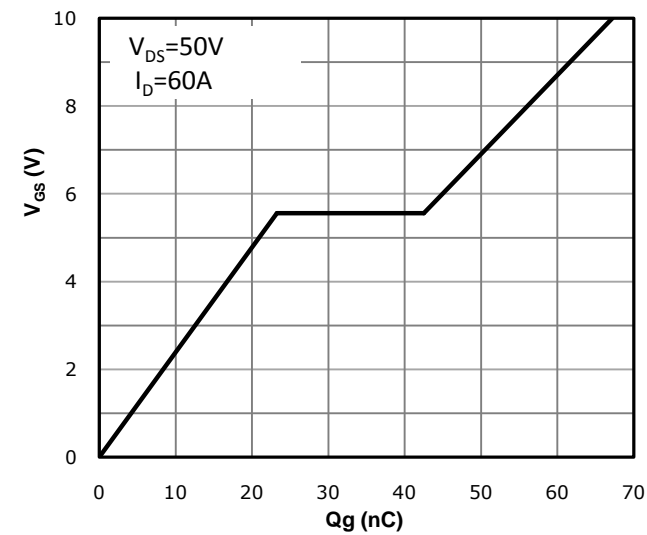


Fig 11: Power Dissipation

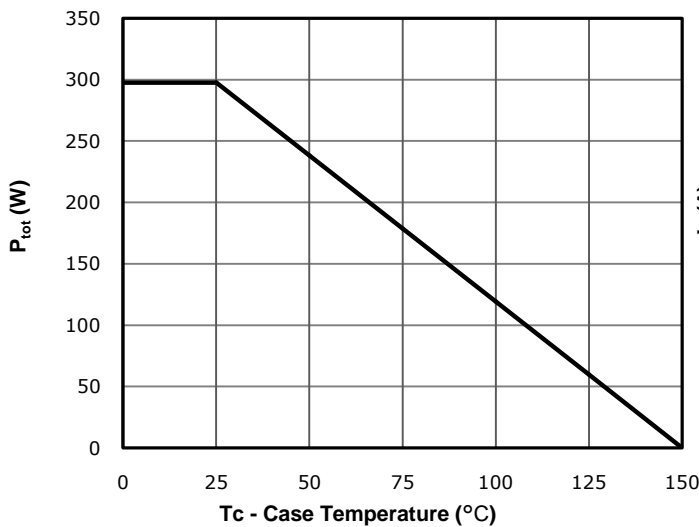


Fig 8: Capacitance Characteristics

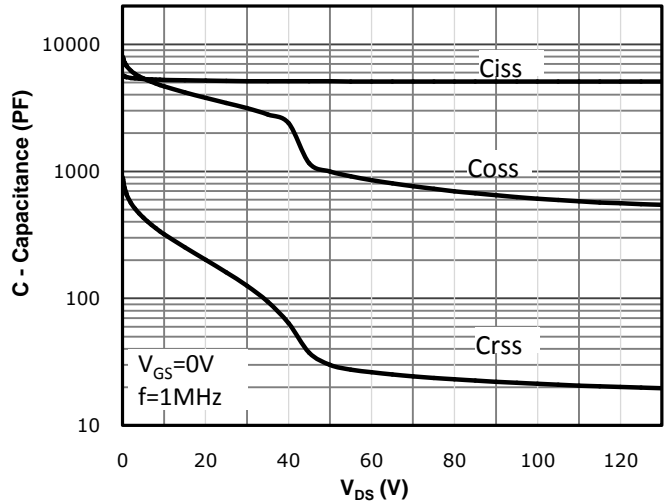


Fig 10: Body-diode Forward Characteristics

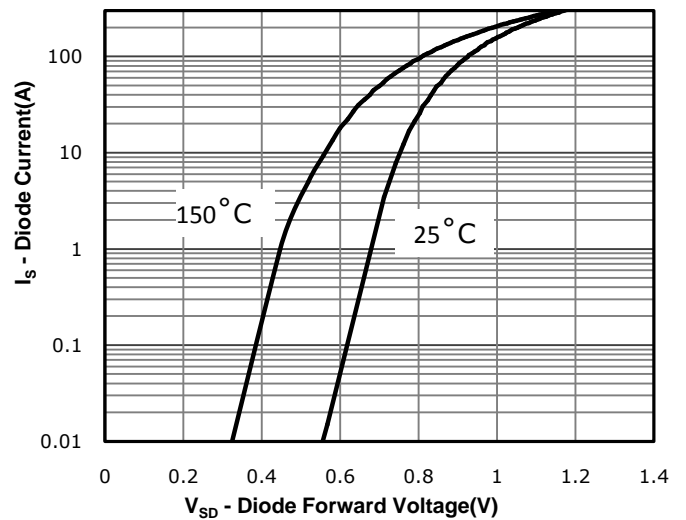


Fig 12: Drain Current Derating

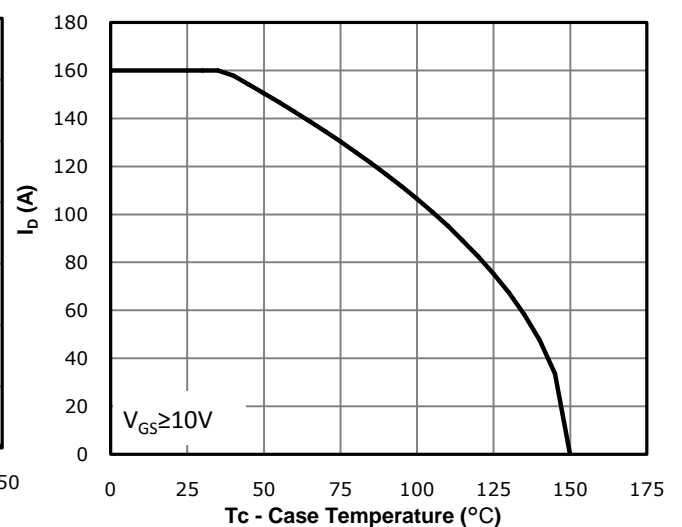


Fig 11: Safe Operating Area

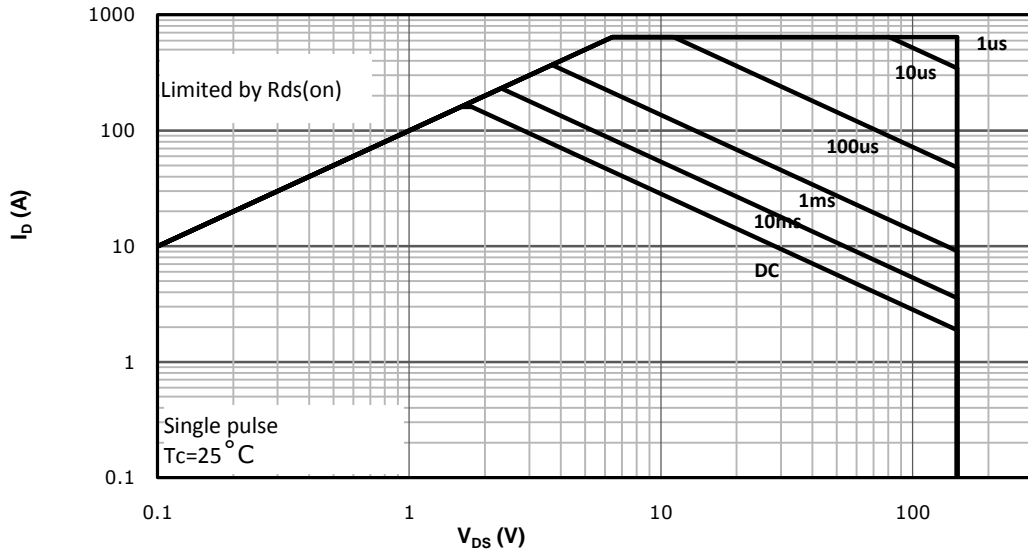
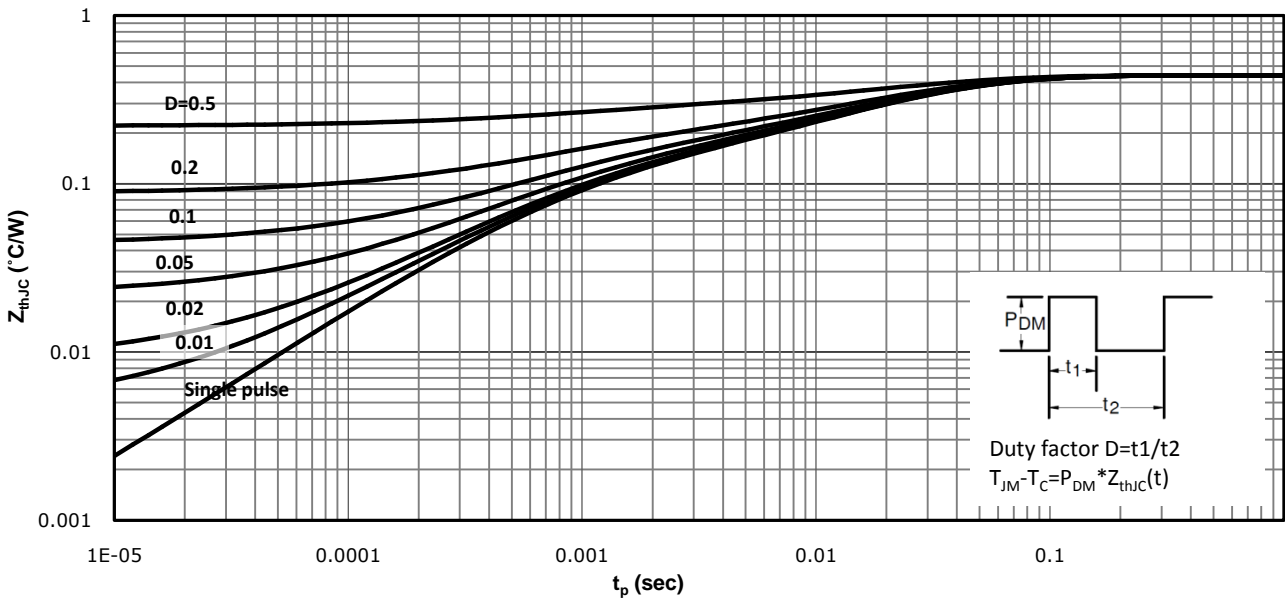
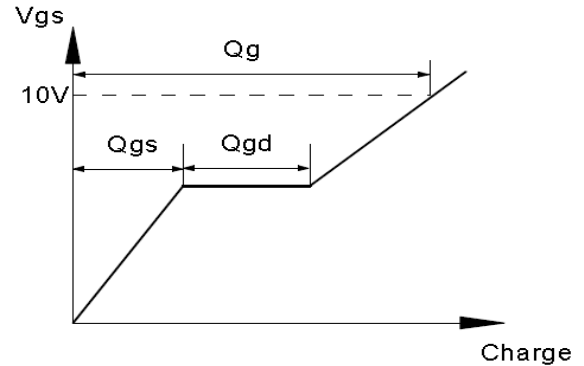
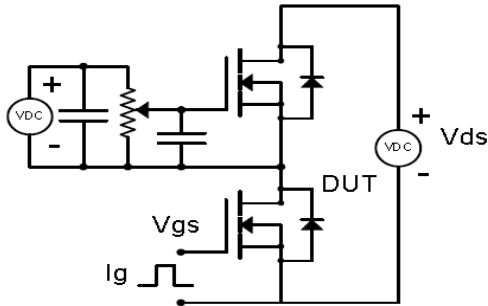


Fig 12: Max. Transient Thermal Impedance

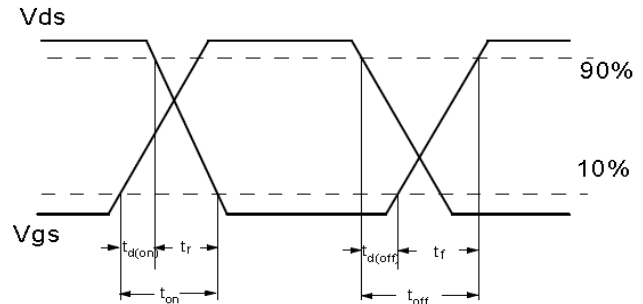
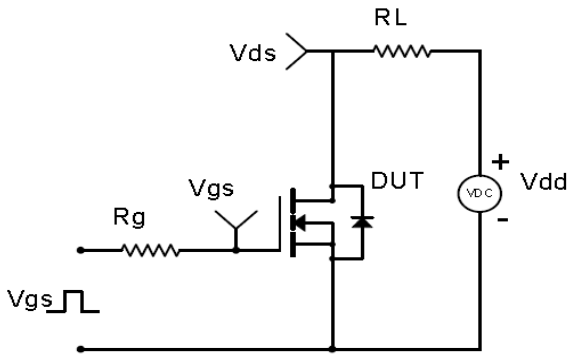


Test Circuit & Waveform

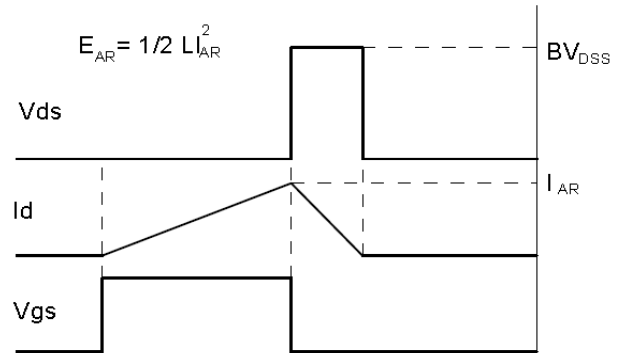
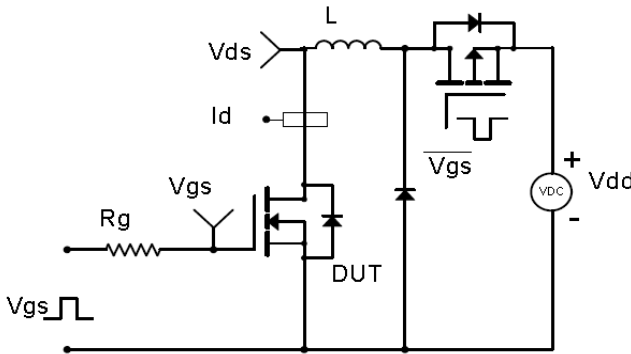
Gate Charge Test Circuit & Waveform



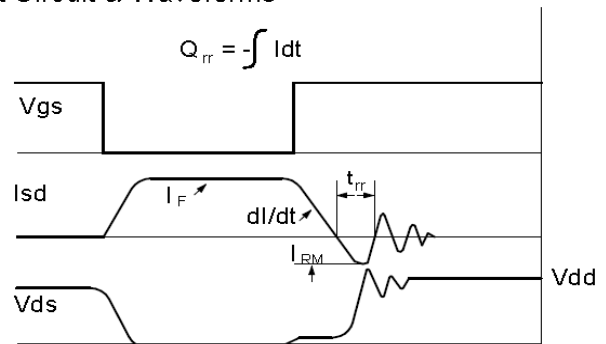
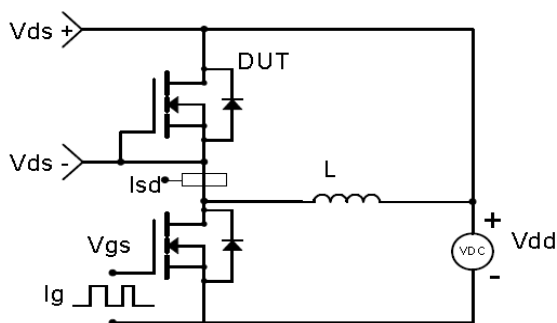
Resistive Switching Test Circuit & Waveforms

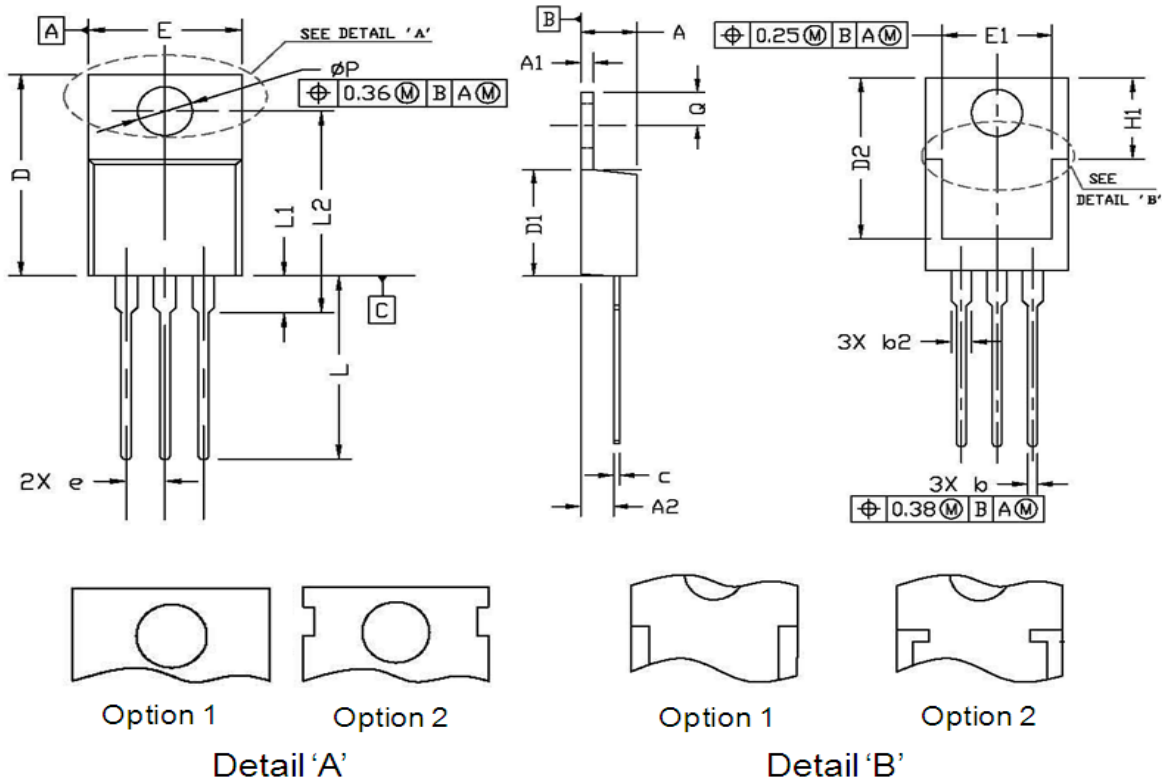


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

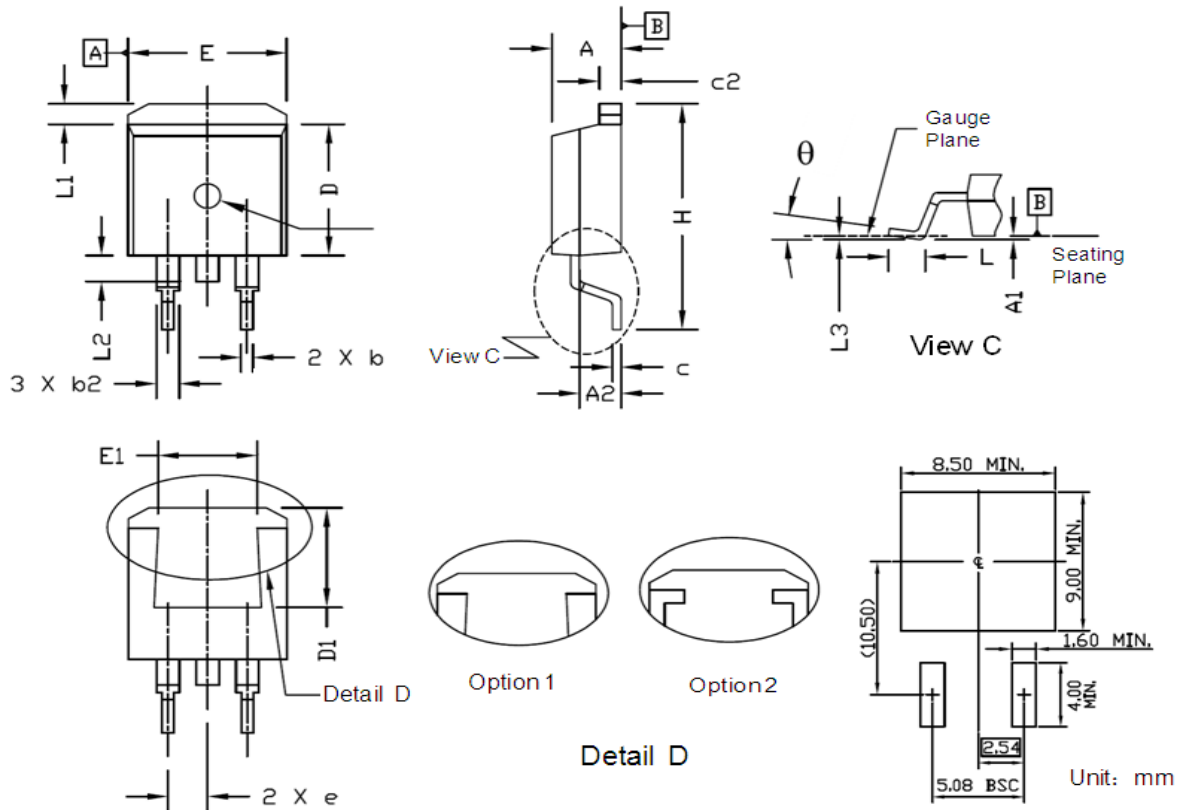


Diode Recovery Test Circuit & Waveforms



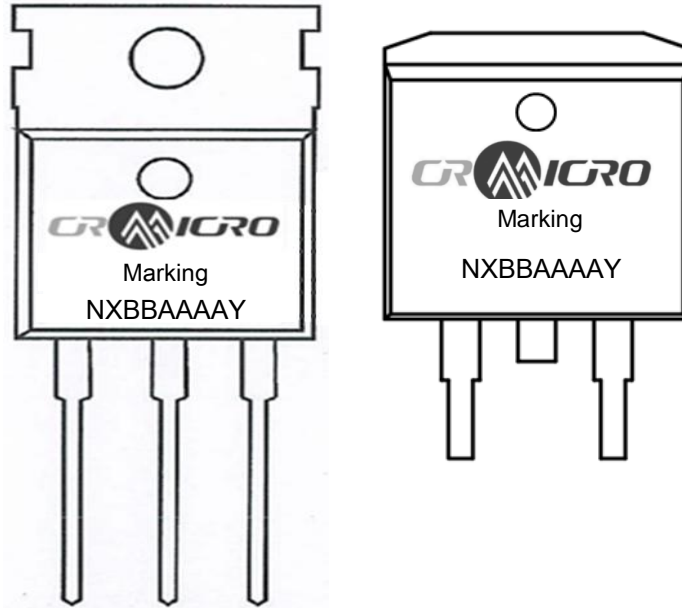
Package Outline: TO-220-3L


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.30	4.80	0.169	0.189
A1	1.20	1.45	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	8.89	0.276	0.350
H1	6.20	7.00	0.244	0.276
L	12.60	14.80	0.496	0.583
L1	2.70	3.80	0.106	0.150
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

Package Outline: TO-263


Symbol	Dimensions In Millimeters		Dimensions In Inches		
	Min.	Max.	Min.	Max.	
A	4.30	4.86	0.169	0.191	
A1	0.00	0.25	0.000	0.010	
A2	2.20	2.90	0.087	0.114	
b	0.68	0.94	0.027	0.037	
b2	1.14	1.78	0.045	0.070	
c	0.33	0.65	0.013	0.026	
c2	1.17	1.40	0.046	0.055	
D	8.38	9.45	0.330	0.372	
D1	6.90	8.17	0.272	0.322	
e	2.54 BSC.		0.100 BSC.		
E	9.78	10.50	0.385	0.413	
E1	6.50	8.60	0.256	0.339	
H	14.61	15.88	0.575	0.625	
L	1.78	2.79	0.070	0.110	
L1	0.70	1.60	0.028	0.063	
L2	1.00	1.78	0.039	0.070	
L3	0.25 BSC.		0.010 BSC.		
θ	Option A	-8°	0°	-8°	0°
	Option B	0°	8°	0°	8°

Marking



NOTE:

NXBBAAAAY

- N —Wire Bond code
- X —Assembly location code
- BB —Fab code
- AAAA —Lot code
- Y —Bin code



华润微电子(重庆)有限公司

CRST052N15N3Z, CRSS049N15N3Z

SkyMOS3 N-MOSFET 150V, 4mΩ, 160A

Revision History

Revision	Date	Major changes
1.0	2023/6/25	Release formal 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.