SkyMOS3 N-MOSFET 80V, 3.2mΩ, 160A

Features

- Uses CRM(CQ) advanced SkyMOS3 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)

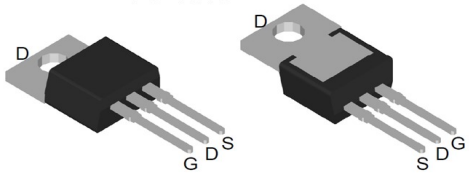
Product Summary

V_{DS}	80V
$R_{DS(on).typ}$	3.2mΩ
I_D	160A

100% DVDS Tested
100% Avalanche Tested

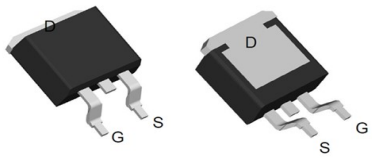
RoHS HF

TO-220

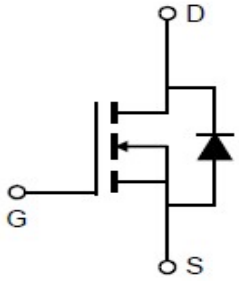


CRST038N08N3

TO-263



CRSS037N08N3



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRST038N08N3	CRST038N08N3	TO-220	Tube	N/A	N/A	50pcs
CRSS037N08N3	CRSS037N08N3	TO-263	Tape	N/A	N/A	800/1000pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	80	V
Continuous drain current T_C = 25°C (Silicon limit) T_C = 25°C (Package limit) T_C = 100°C (Silicon limit)	I_D	 160 180 100	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\,pulse}$	640	A
Avalanche energy, single pulse (ID = 53A, Rg=25Ω)[1]	E_{AS}	712	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	169	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 =53A, VGS = 10V.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	0.74	°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}	85	-	-	V	V_{GS}=0V, I_D=250uA
		85	-	-	V	V_{GS}=0V, I_D=1mA
Gate threshold voltage	$V_{GS(th)}$	2.2	3.2	4.2	V	V_{DS}=V_{GS},I_D=250uA
Zero gate voltage drain current	I_{DSS}	- -	- -	1 100	μA	V_{DS}=80V,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	$R_{DS(on)}$	- -	3.2 3.0	3.8 3.7	mΩ	VGS=10V, ID=60A TO-220 TO-263
Transconductance	g_{fs}	-	116.0	-	S	V_{DS}=5V, I_D=60A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	5489	-	pF	V_{GS}=0V, V_{DS}=40V, f=1MHz
Output Capacitance	C_{oss}	-	1073	-		
Reverse Transfer Capacitance	C_{rss}	-	31	-		
Gate Total Charge	Q_G	-	89.5	-	nC	V_{GS}=10V, V_{DS}=40V, I_D=60A
Gate-Source charge	Q_{gs}	-	30.4	-		
Gate-Drain charge	Q_{gd}	-	22.9	-		
Turn-on delay time	$t_{d(on)}$	-	19.5	-	ns	V_{GS}=10V, V_{DD}=40V, R_{G_ext}=2.7Ω
Rise time	t_r	-	92.6	-		
Turn-off delay time	$t_{d(off)}$	-	52.4	-		
Fall time	t_f	-	102.9	-		
Gate resistance	R_G	-	1.5	-	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}	-	0.95	1.4	V	V_{GS}=0V,I_{SD}=60A
Body Diode Reverse Recovery Time	t_{rr}	-	57.8	-	ns	I_F=60A,dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	77.4	-	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

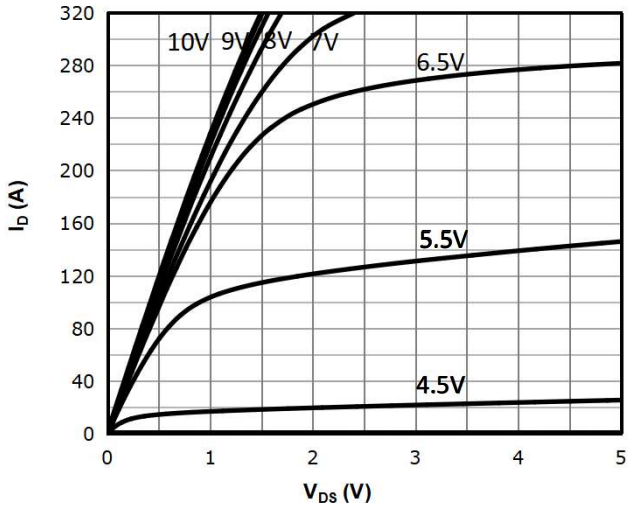


Fig 2: Transfer Characteristics

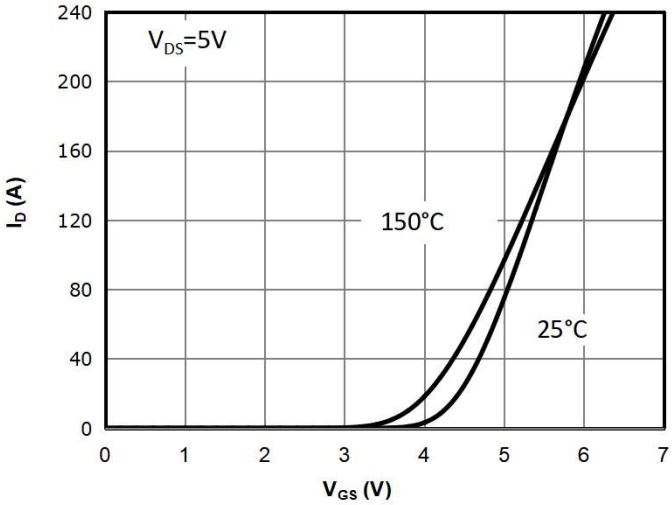


Fig 3: Rds(on) vs Drain Current and Gate Voltage

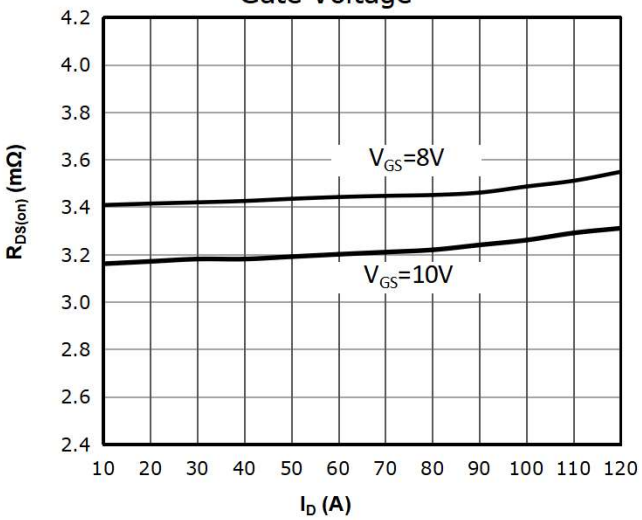


Fig 4: Rds(on) vs Gate Voltage

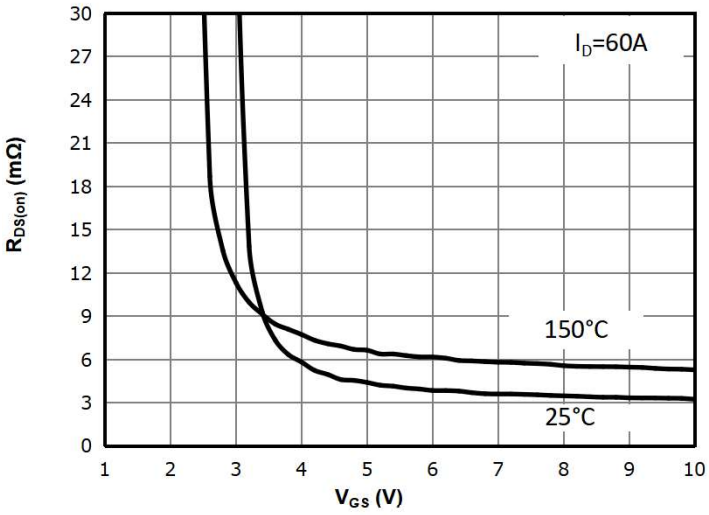


Fig 5: Rds(on) vs. Temperature

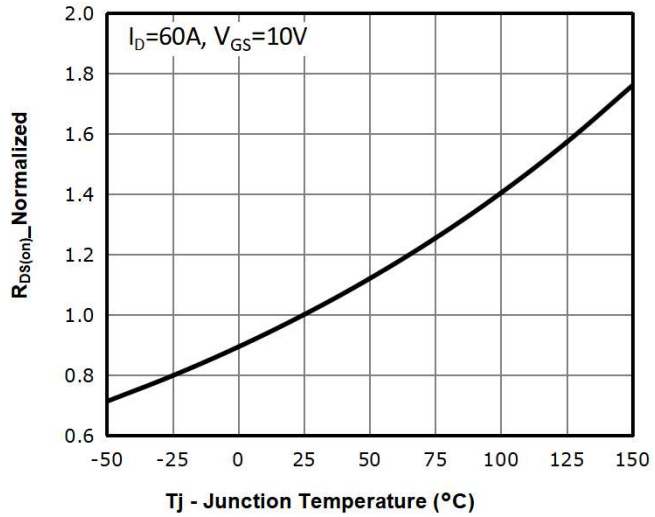


Fig 6: Vgs(th) vs. Temperature

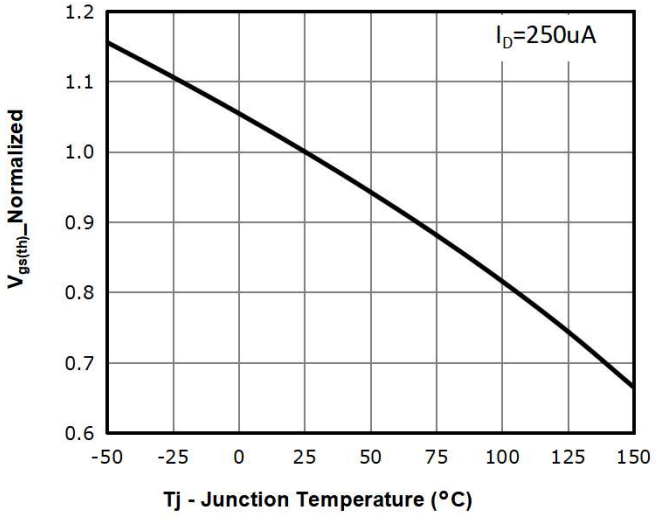


Fig 7: BVdss vs. Temperature

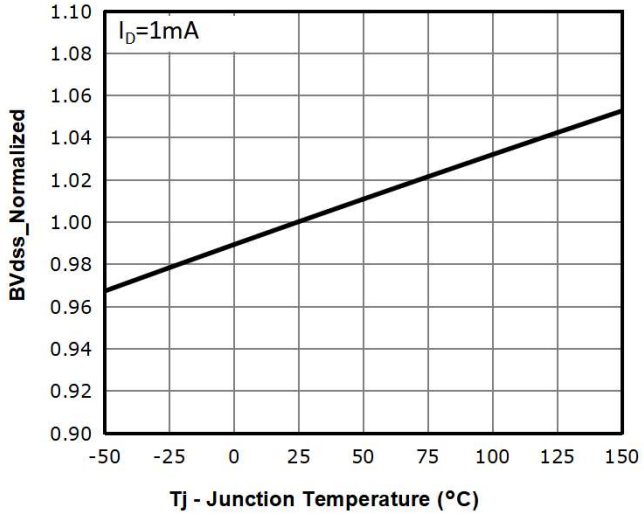


Fig 8: Capacitance Characteristics

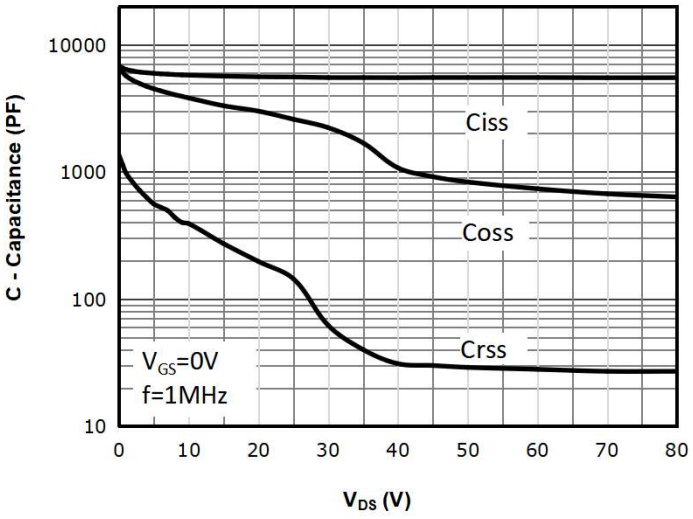


Fig 9: Gate Charge Characteristics

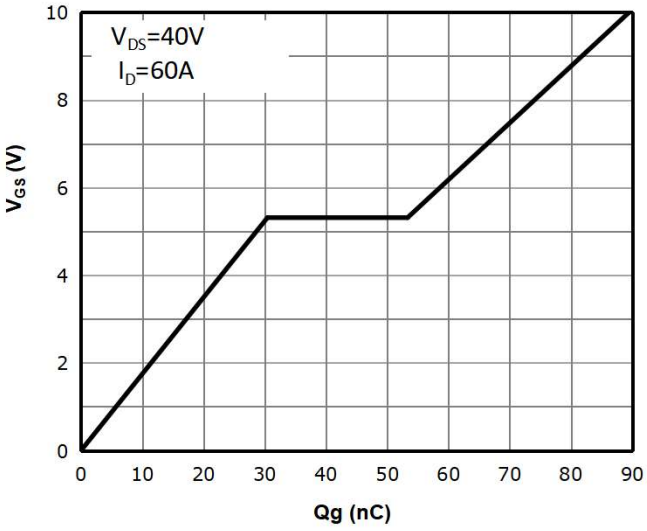


Fig 10: Body-diode Forward Characteristics

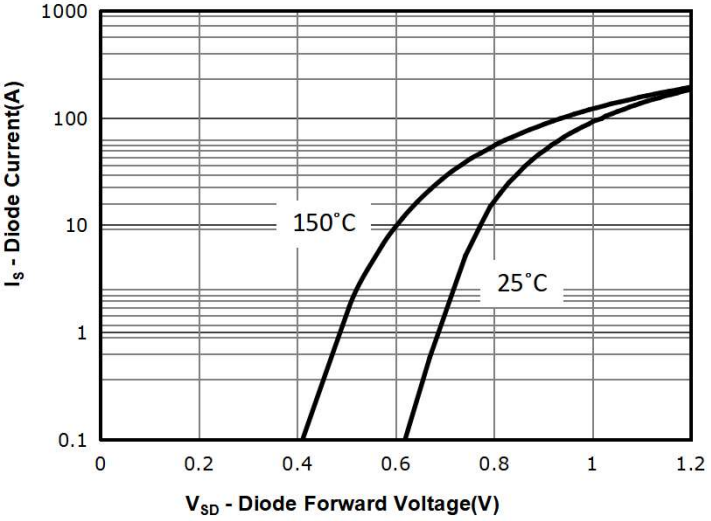


Fig 11: Power Dissipation

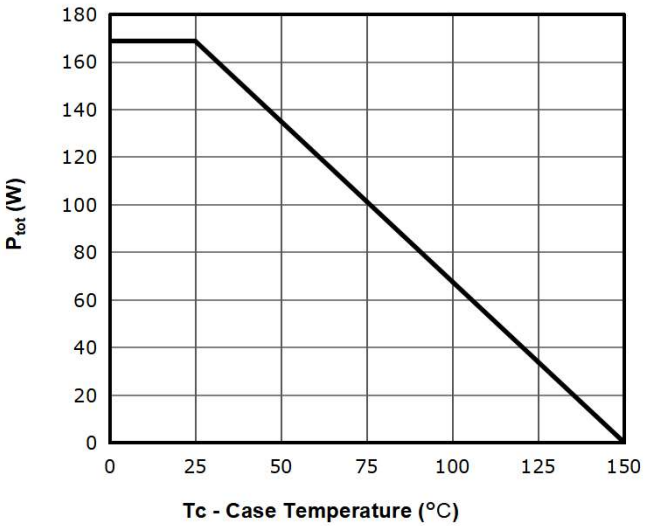


Fig 12: Drain Current Derating

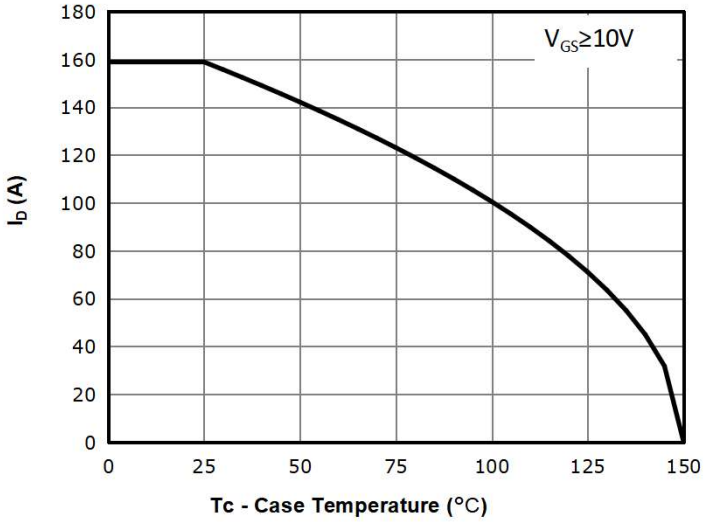


Fig 13: Safe Operating Area

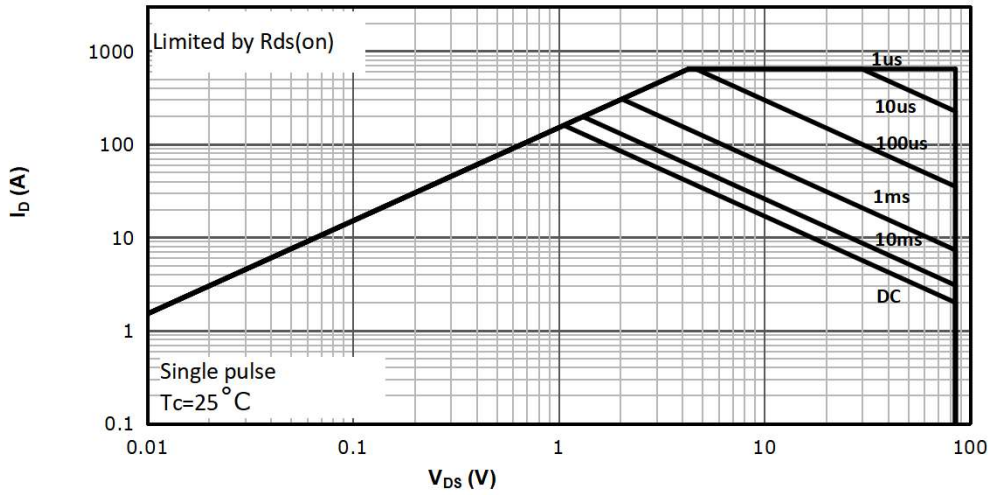
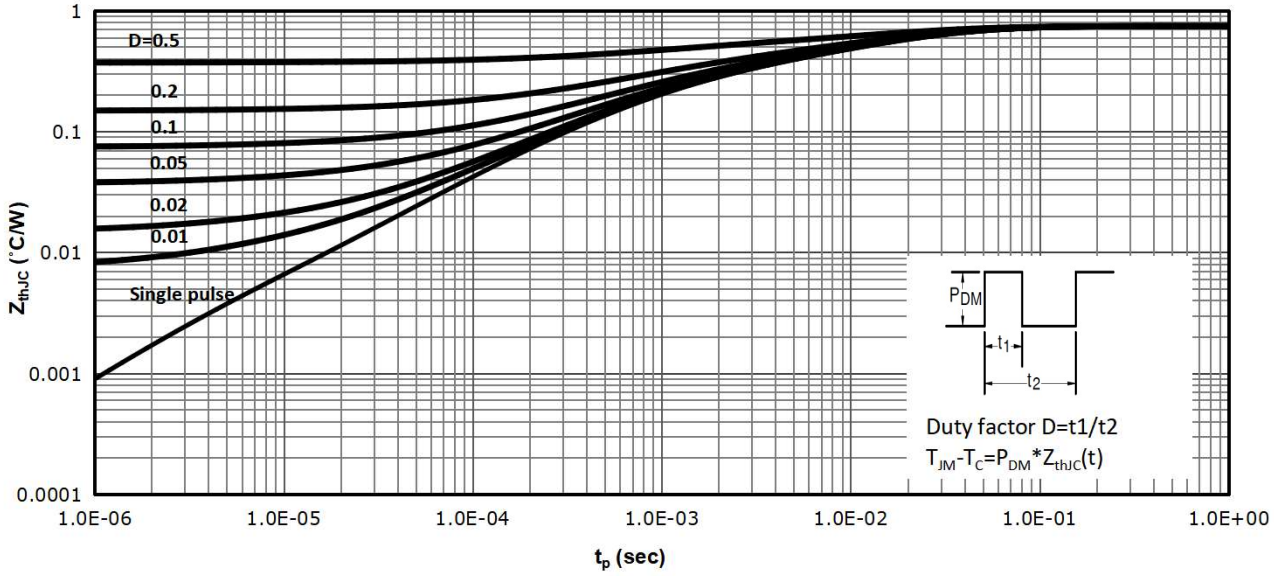
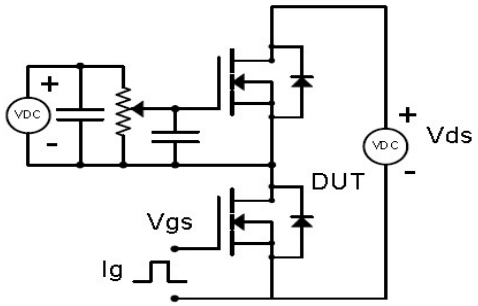


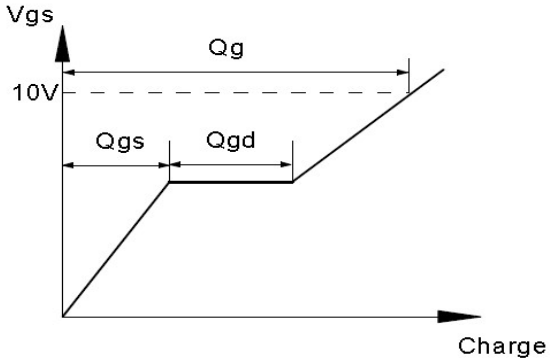
Fig 14: Max. Transient Thermal Impedance



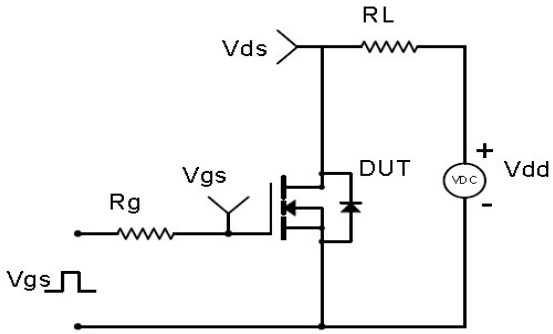
Test Circuit & Waveform

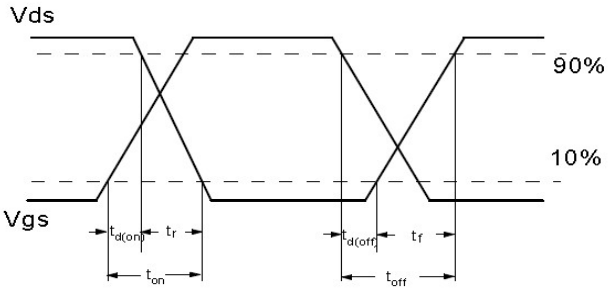
Gate Charge Test Circuit & Waveform



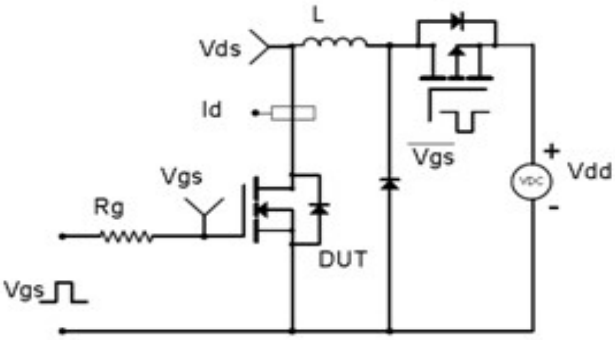


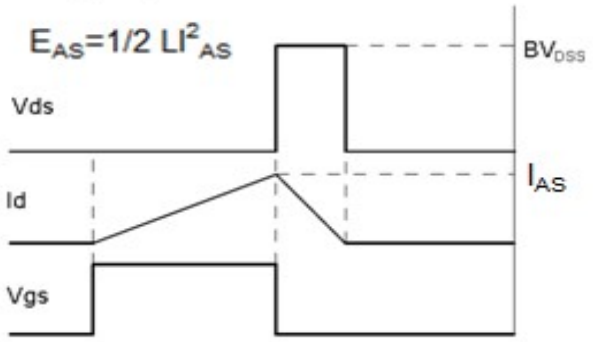
Resistive Switching Test Circuit & Waveforms



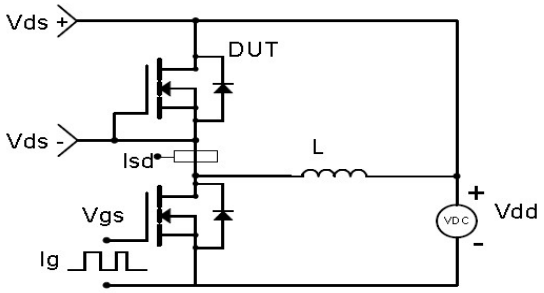


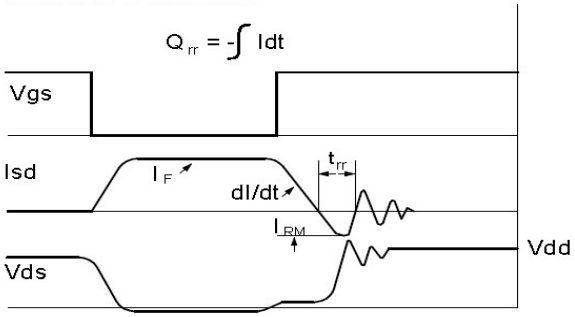
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



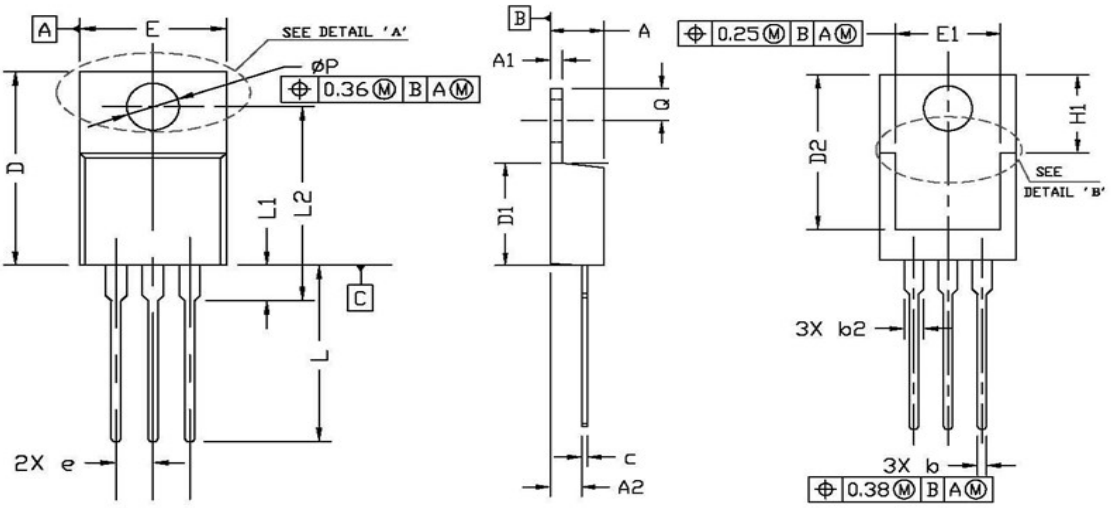


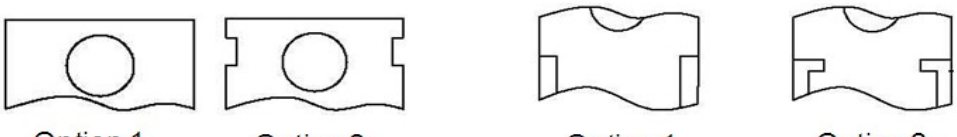
Diode Recovery Test Circuit & Waveforms





Package Outline: TO-220-3L

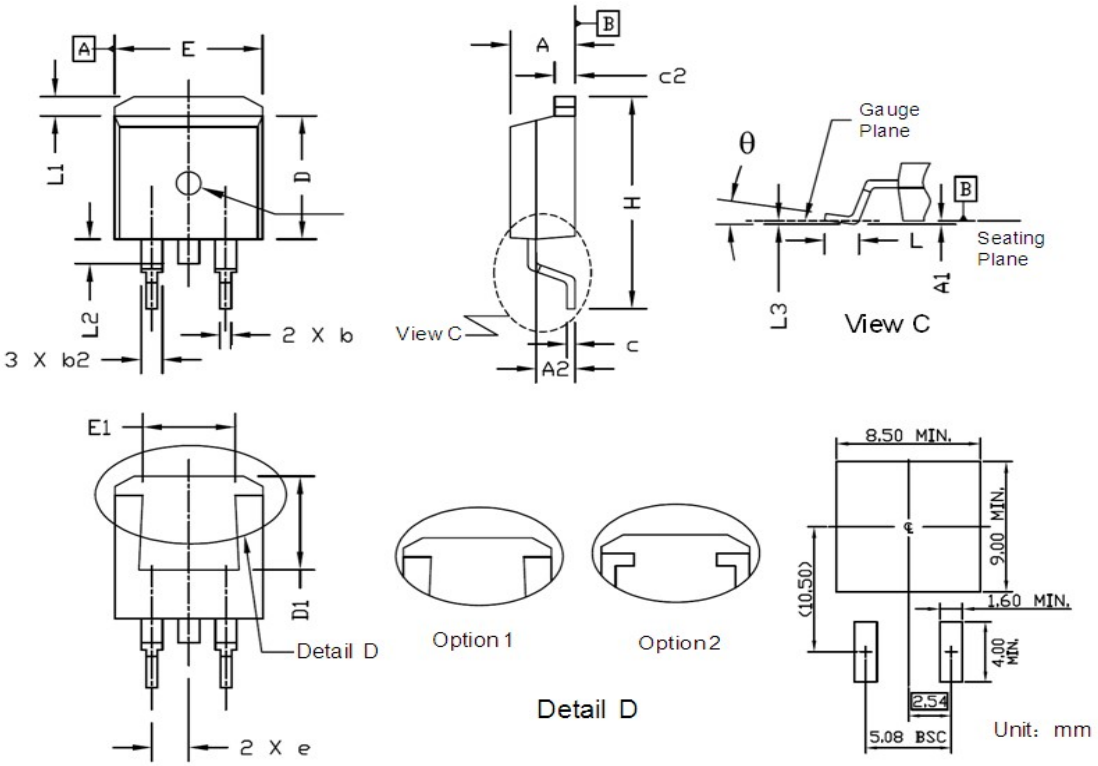




Detail 'A' Detail 'B'

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:
NXBBAAAA-Y

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

Revision History

Revision	Date	Major changes
1.0	2023/5/22	Release of Preliminary version.
2.0	2023/9/18	BVDS guarantee 85V min Spec;
3.0	2024/9/3	Continuous drain current & VTH spec update;

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.