CRST020N06N2

SkyMOS2 N-MOSFET 60V, 1.78mΩ, 160A

Features

- Uses CRM(CQ) advanced SkyMOS2 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
$R_{DS(on)}$	1.78mΩ
I_D	160A

Applications

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

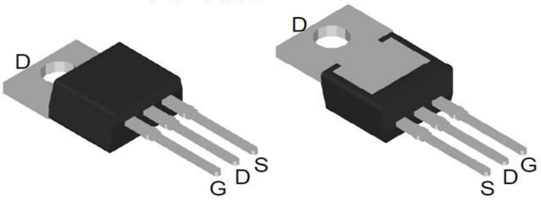
100% DVDS Tested

100% Avalanche Tested

RoHS

H F

TO-220



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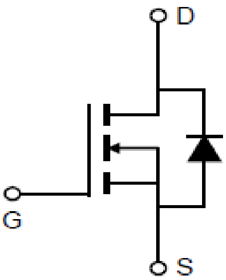


Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRST020N06N2	CRST020N06N2	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	224 160 142	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	640	A
Avalanche energy, single pulse (L=0.5mH，I_{PEAK}=43A)	E_{AS}	925	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	187	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

Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case.	R_{thJC}	-	0.40	0.67	°C/W	
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	-	-	62	°C/W	

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}	60	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	2	-	4	V	V_{DS}=V_{GS},I_D=250uA
Zero gate voltage drain current	I_{DSS}				μA	V_{DS}=60V,V_{GS}=0V
		-	0.05	1		T_j=25°C
		-	-	100		T_j=125°C
Gate-source leakage current	I_{GSS}	-	±10	±100	nA	V_{GS}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	1.8	2.1	mΩ	V_{GS}=10V, I_D=80A
		-	1.9	2.3	mΩ	Vgs=8V, Id=80A
Transconductance	g_{fs}	-	192.0	-	S	V_{DS}=5V,I_D=80A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	7460	11190	pF	V_{GS}=0V, V_{DS}=30V, f=1MHz
Output Capacitance	C_{oss}	-	4557	6835.5		
Reverse Transfer Capacitance	C_{rss}	-	96	192		
Gate Total Charge	Q_G	-	109.6	164.4	nC	V_{GS}=10V, V_{DS}=30V, I_D=80A, f=1MHz
Gate-Source charge	Q_{gs}	-	40.2	-		
Gate-Drain charge	Q_{gd}	-	23.0	46.1		
Turn-on delay time	$t_{d(on)}$	-	20.8	-	ns	V_{GS}=10V, V_{DD}=50V, R_{G_ext}=3.0Ω
Rise time	t_r	-	111	-		
Turn-off delay time	$t_{d(off)}$	-	60.4	-		
Fall time	t_f	-	110.1	-		

Gate resistance	R_G	-	2.8	4.2	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}	-	0.87	1.31	V	V_{GS}=0V,I_{SD}=80A
Body Diode Continuous Forward Current	I_S	-	-	160	A	T_C = 25°C
Body Diode Pulsed Current	$I_{S\ pulse}$	-	-	640	A	T_C = 25°C
Body Diode Reverse Recovery Time	t_{rr}	-	94.6	189.1	ns	I_F=80A,dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	161.7	323.3	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

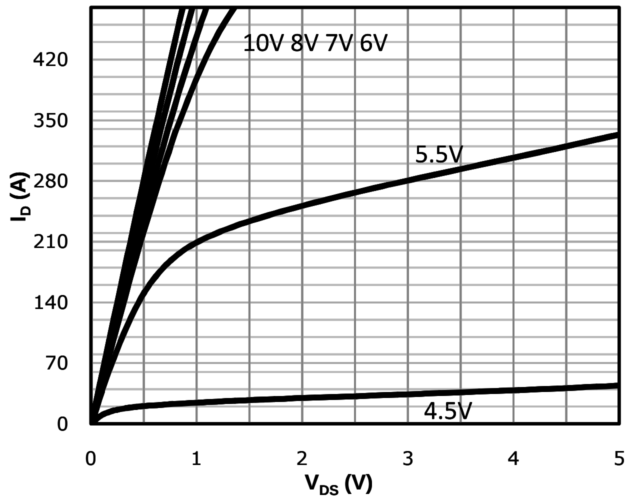
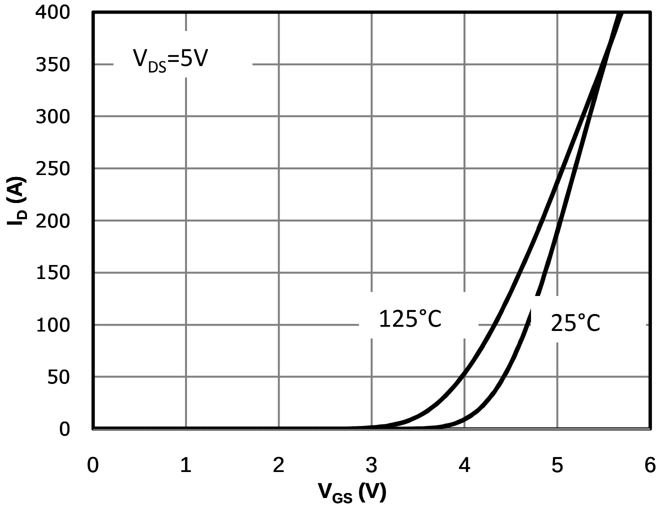


Fig 2: Transfer Characteristics



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

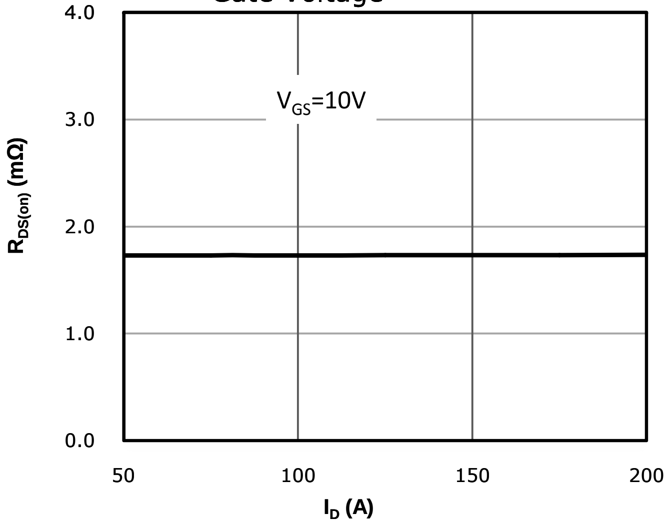


Fig 4: Rds(on) vs Gate Voltage

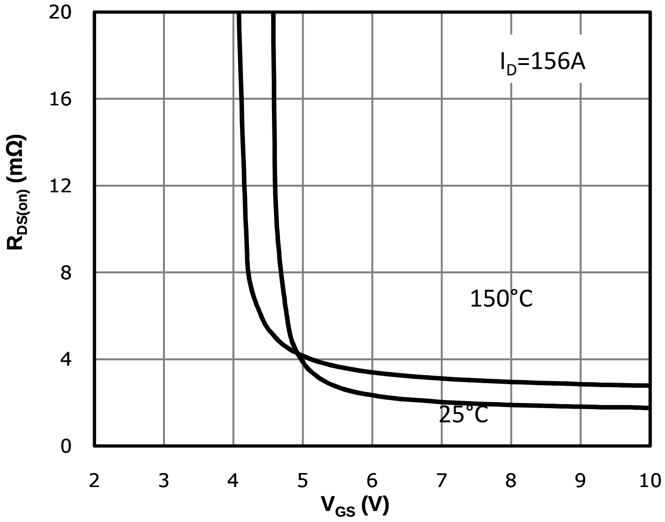


Fig 5: Rds(on) vs. Temperature

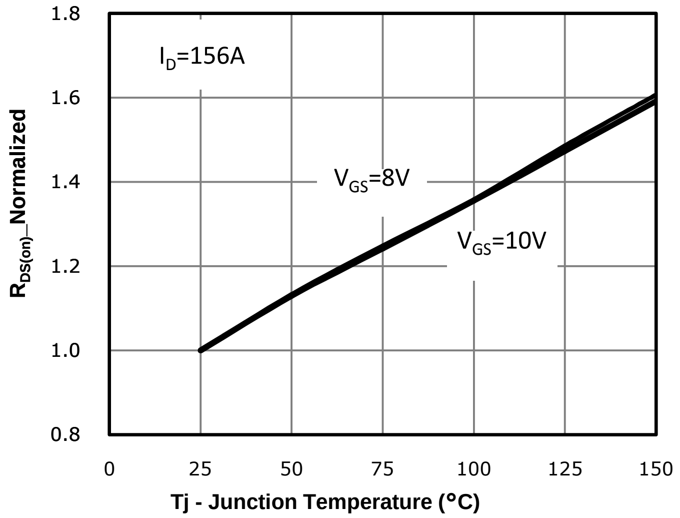


Fig 6: Capacitance Characteristics

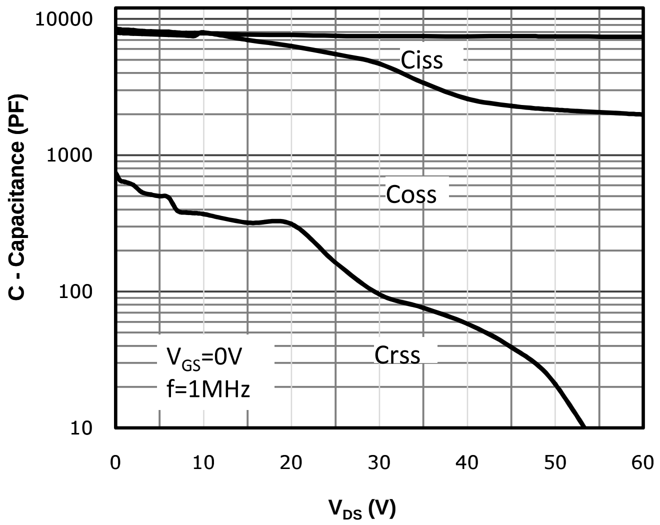


Fig 7: Gate Charge Characteristics

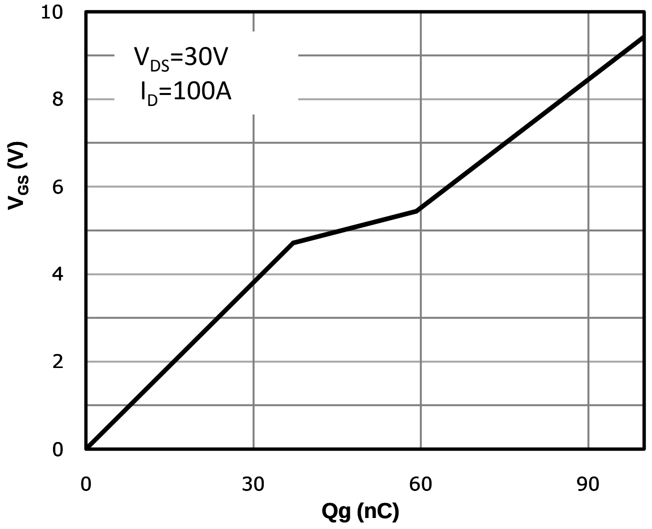


Fig 8: Body-diode Forward Characteristics

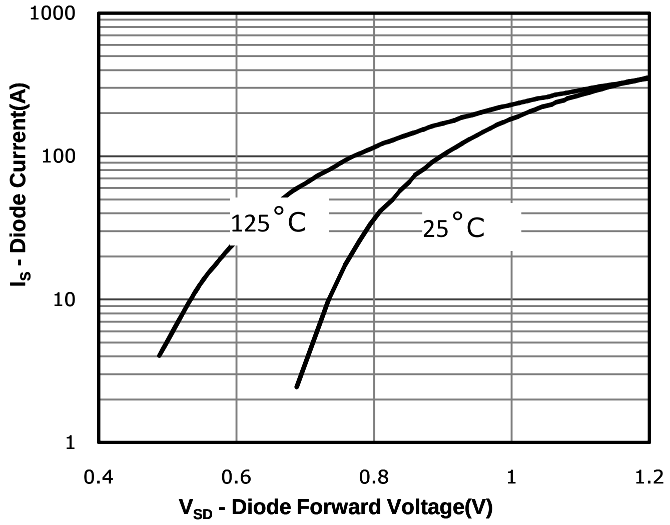


Fig 9: Power Dissipation

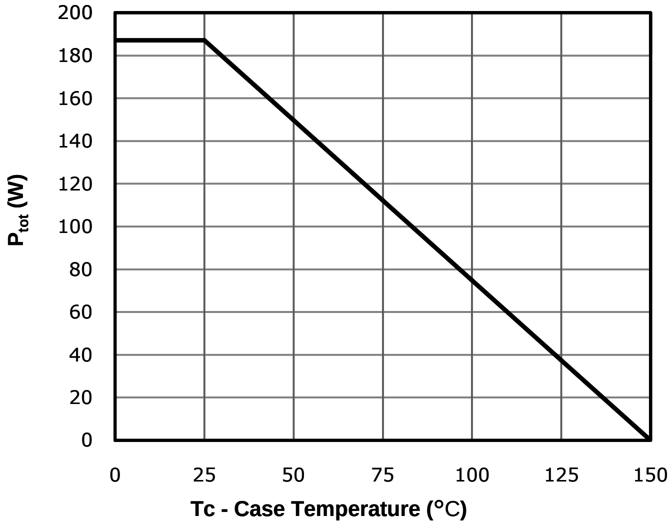


Fig 10: Drain Current Derating

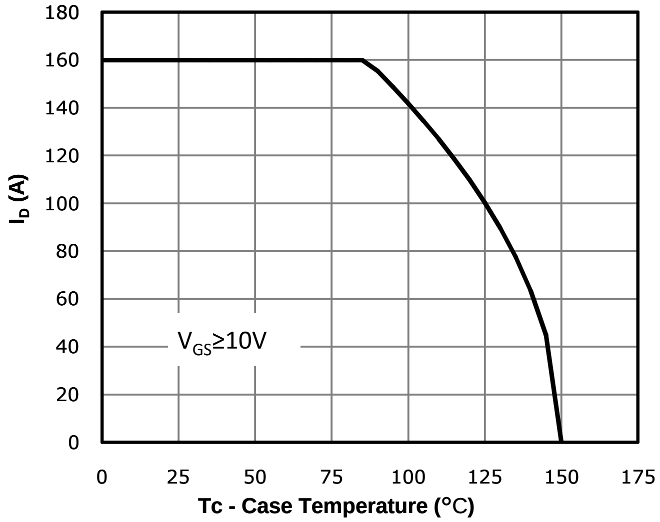


Fig 11: Safe Operating Area

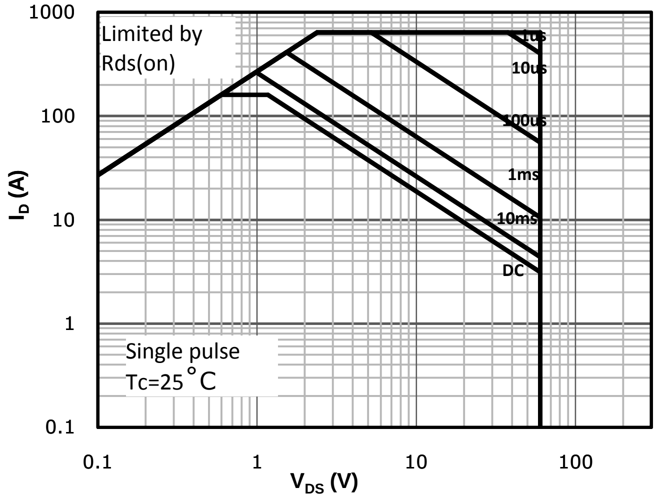
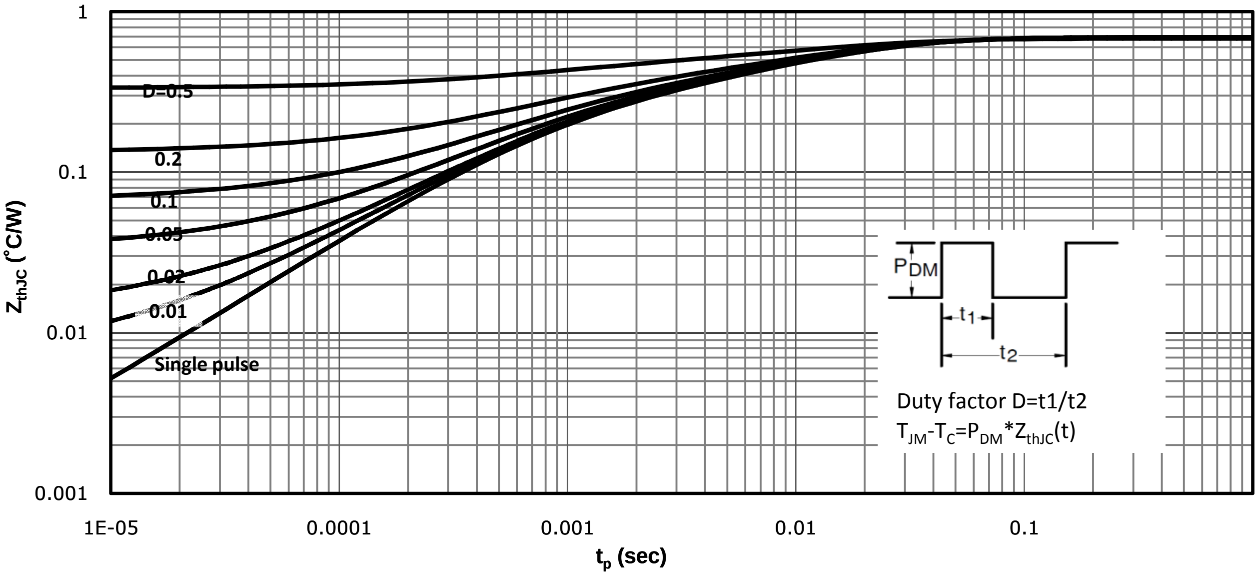
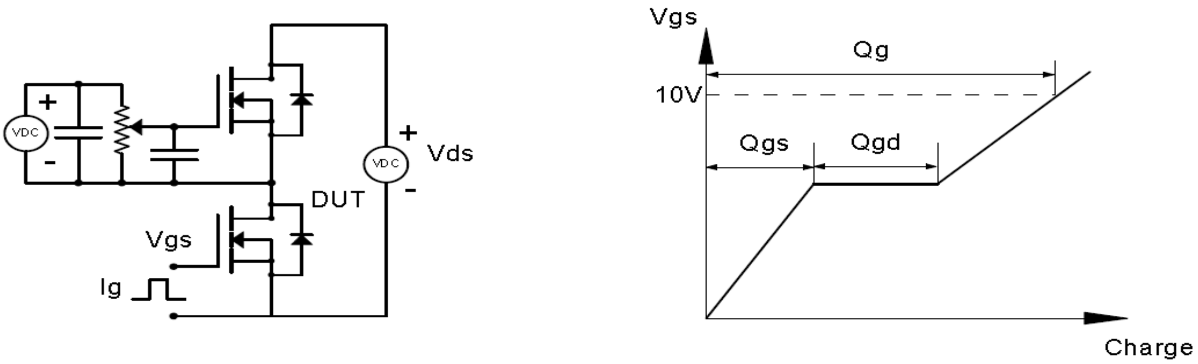


Fig 12: Max. Transient Thermal Impedance

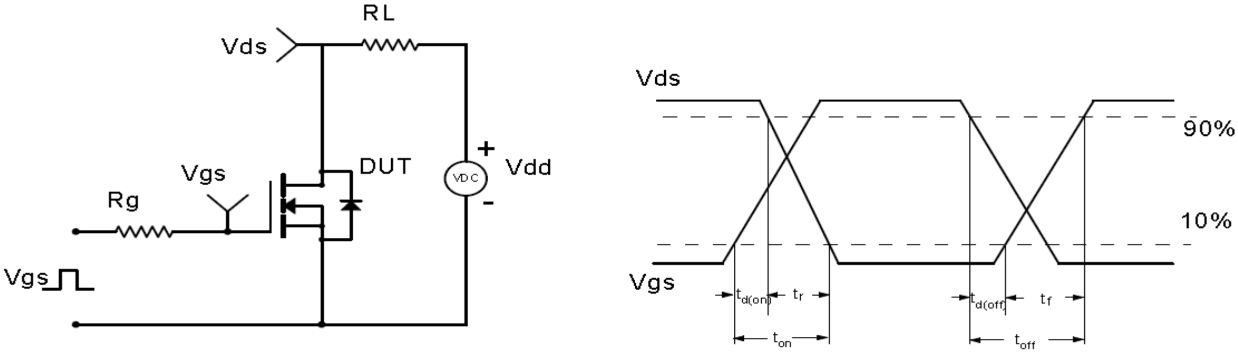


Test Circuit & Waveform

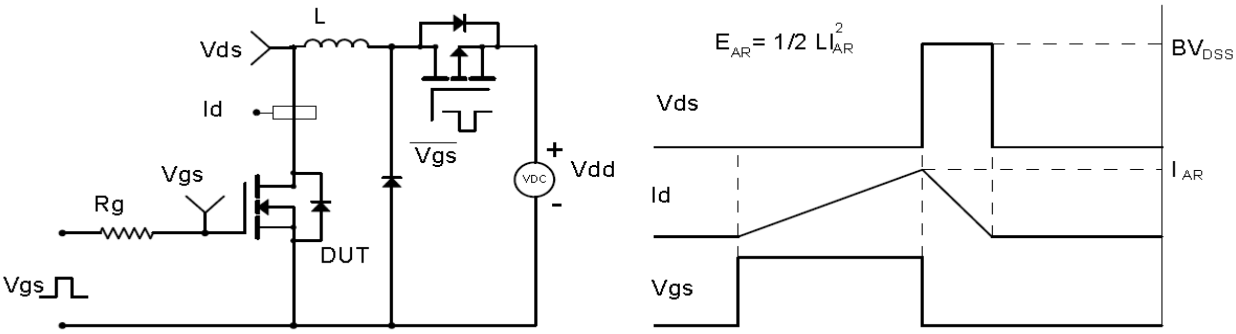
Gate Charge Test Circuit & Waveform



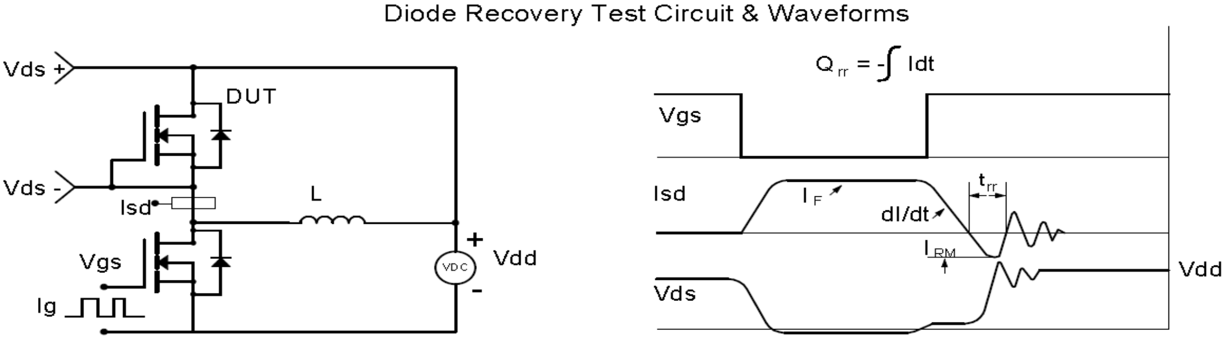
Resistive Switching Test Circuit & Waveforms



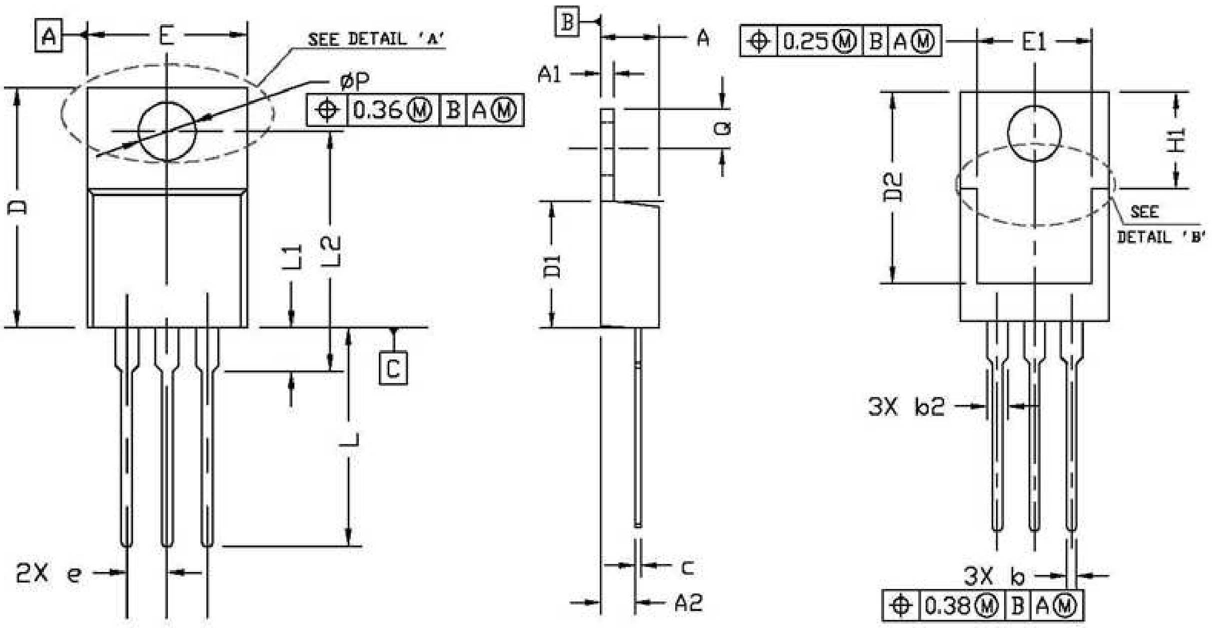
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

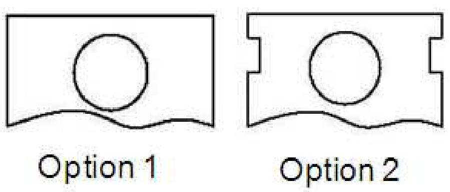


Diode Recovery Test Circuit & Waveforms

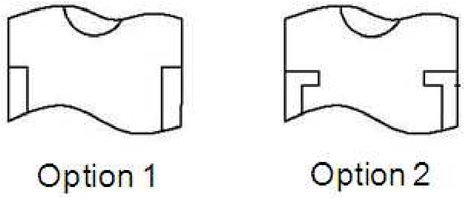


Package Outline: TO-220-3L





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	8.46	0.276	0.333
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	3.90	0.138	0.154

Marking

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

Revision History

Revison	Date	Major changes
1.0	2020-4-9	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.