

Features

- Uses CRM(CQ) advanced SkyMOS2 technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- AEC-Q101 Qualified

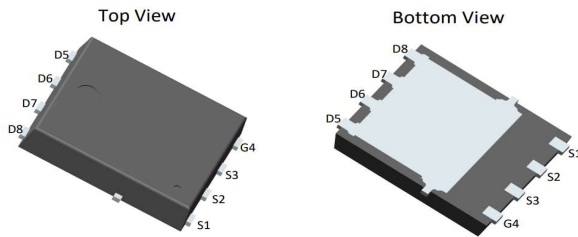
Product Summary

V_{DS}	40V
$R_{DS(on).typ}$	2.1mΩ
I_D	120A

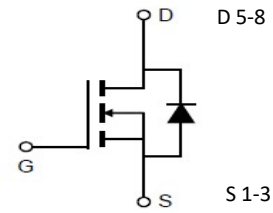
Applications

- DCDC Converter
- Switching applications
- UPS (Uninterruptible Power Supplies)

100% DVDS Tested
100% Avalanche Tested



CRSM023N04N2Z



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSM023N04N2Z	023N04N2Z	PDFN5x6	Tape&reel	N/A	N/A	4000pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	40	V
Continuous drain current	I_D	120	A
$T_C = 25^\circ\text{C}$ (Silicon limit)		86	
$T_C = 100^\circ\text{C}$ (Silicon limit)			
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D \text{ pulse}}$	480	A
Avalanche energy, single pulse ($I_{AS} = 35\text{A}$, $R_g = 25\Omega$) ^[1]	E_{AS}	180	mJ
Gate-Source voltage	V_{GS}	± 20	V
Power dissipation ($T_C = 25^\circ\text{C}$)	P_{tot}	65	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+175	$^\circ\text{C}$
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)	T_{sold}	260	$^\circ\text{C}$

※. Notes:

EAS is tested at starting $T_j = 25^\circ\text{C}$, $L = 0.3\text{mH}$, $I_{AS} = 35\text{A}$, $V_{GS} = 10\text{V}$.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case (junction-heat spreader)	R_{thJC}	2.3	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	62	

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

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

Static Characteristic

Drain-source breakdown voltage	BV_{DSS}	40	-	-	V	$V_{GS}=0V, I_D=250\mu A$
		40	-	-	V	$V_{GS}=0V, I_D=1mA$
Gate threshold voltage	$V_{GS(th)}$	2	-	4	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=40V, V_{GS}=0V$ $T_j=25\text{ °C}$
		-	-	100	μA	$T_j=125\text{ °C}$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	2.1	2.6	mΩ	$V_{GS}=10V, I_D=70A$
Transconductance	g_{fs}	-	240	-	S	$V_{DS}=5V, I_D=70A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	2950	-	pF	$V_{GS}=0V, V_{DS}=20V, f=1MHz$
Output Capacitance	C_{oss}	-	950	-		
Reverse Transfer Capacitance	C_{rss}	-	35	-		
Gate Total Charge	Q_G	-	43	-	nC	$V_{GS}=10V, V_{DS}=20V,$ $I_D=70A, f=1MHz$
Gate-Source charge	Q_{gs}	-	19	-		
Gate-Drain charge	Q_{gd}	-	5.0	-		
Turn-on delay time	$t_{d(on)}$	-	13	-	ns	$V_{GS}=10V, V_{DD}=20V,$ $R_{G_ext}=3\Omega$
Rise time	t_r	-	25	-		
Turn-off delay time	$t_{d(off)}$	-	30	-		
Fall time	t_f	-	11	-		
Gate resistance	R_G	-	2.5	-	Ω	$V_{GS}=0V, V_{DS}=0V, f=1MHz$

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Diode continuous forward current	I_S	-	-	120	A	$T_C = 25^{\circ}\text{C}$
Diode pulse current	I_S pulse	-	-	480	A	$T_C = 25^{\circ}\text{C}$
Body Diode Forward Voltage	V_{SD}	-	0.9	1.4	V	$V_{GS}=0V, I_{SD}=70A$
Body Diode Reverse Recovery Time	t_{rr}	-	40	-	ns	$I_F=50A, dI/dt=100A/\mu s$
Body Diode Reverse Recovery Charge	Q_{rr}	-	35	-	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

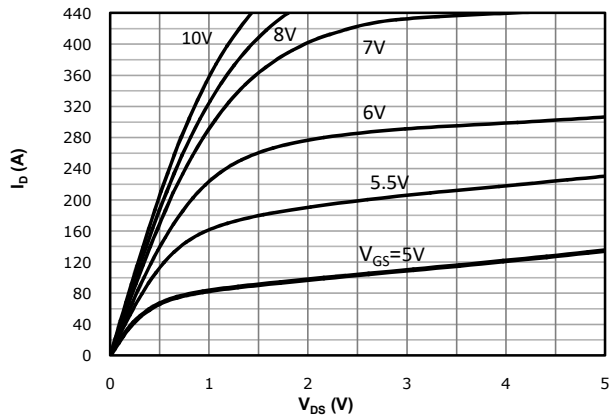


Fig 2: Transfer Characteristics

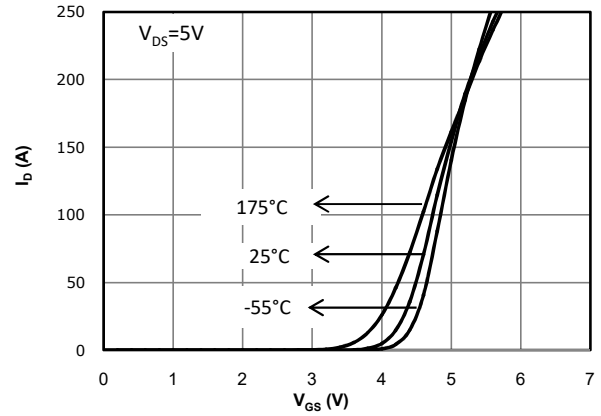


Fig 3: Rds(on) vs Drain Current and Gate Voltage

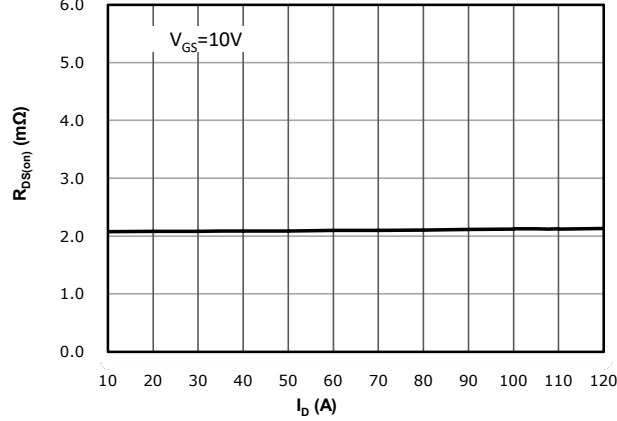


Fig 4: Rds(on) vs Gate Voltage

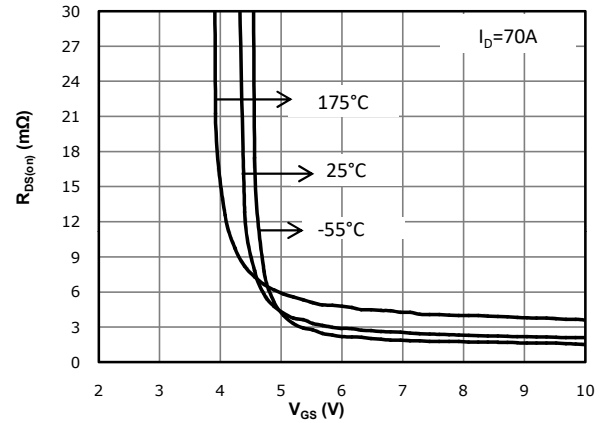


Fig 5: Rds(on) vs. Temperature

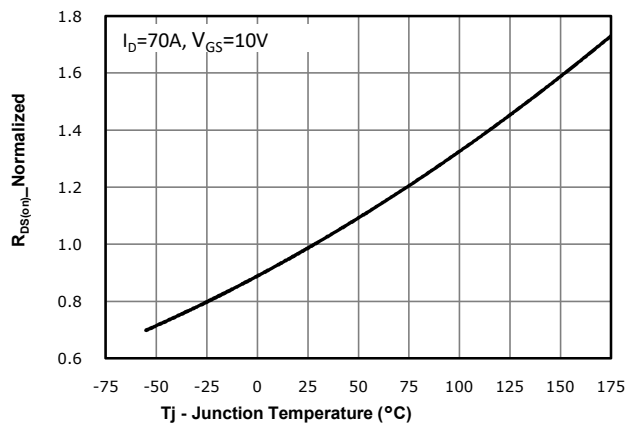


Fig 6: Vgs(th) vs. Temperature

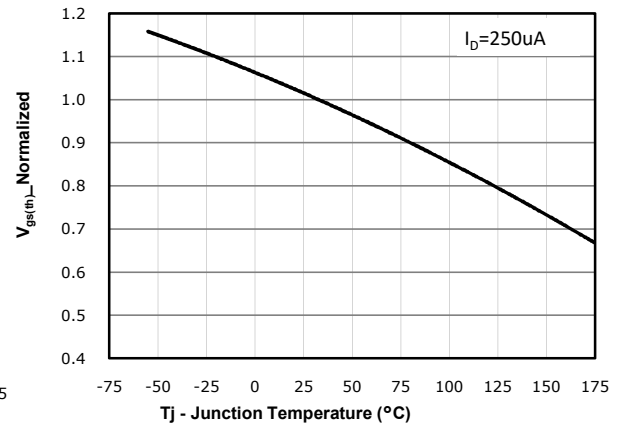


Fig 7: BVdss vs. Temperature

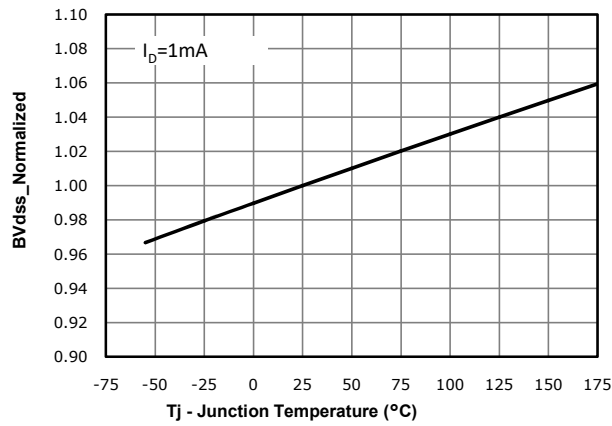


Fig 8: Capacitance Characteristics

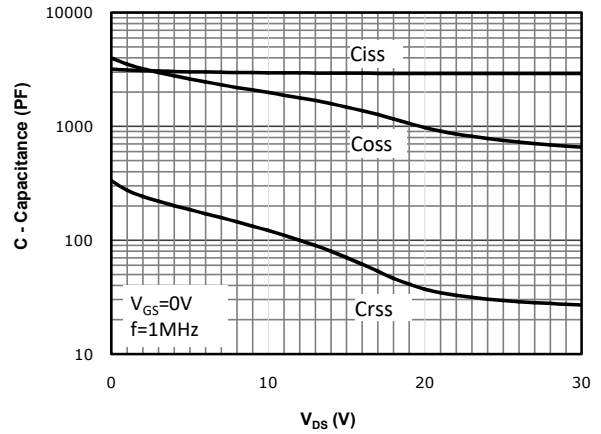


Fig 9: Gate Charge Characteristics

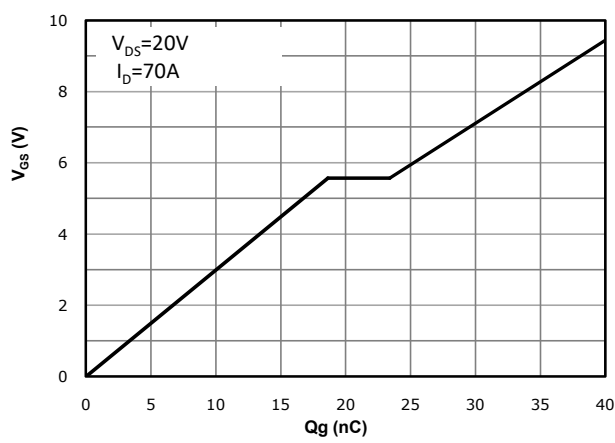


Fig 10: Body-diode Forward Characteristics

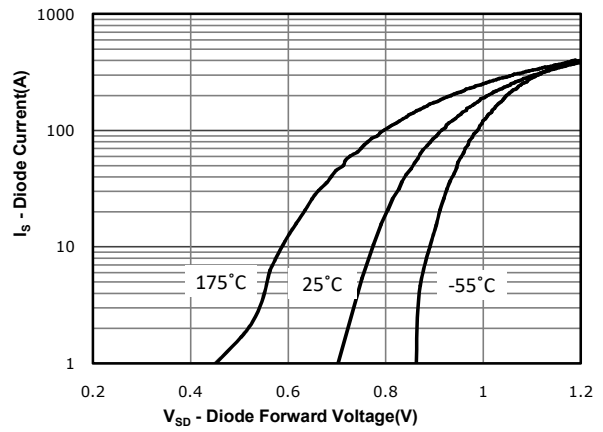


Fig 11: Power Dissipation

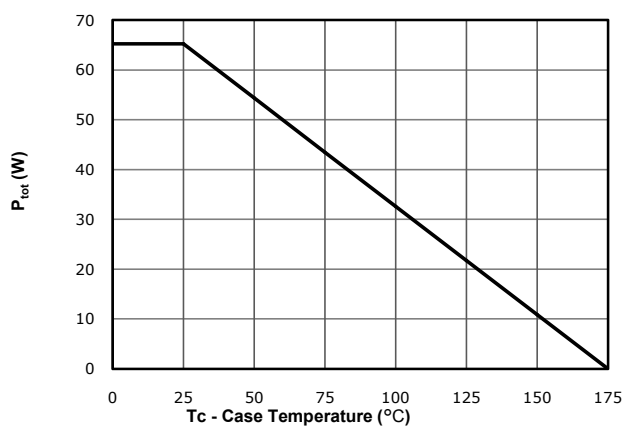


Fig 12: Drain Current Derating

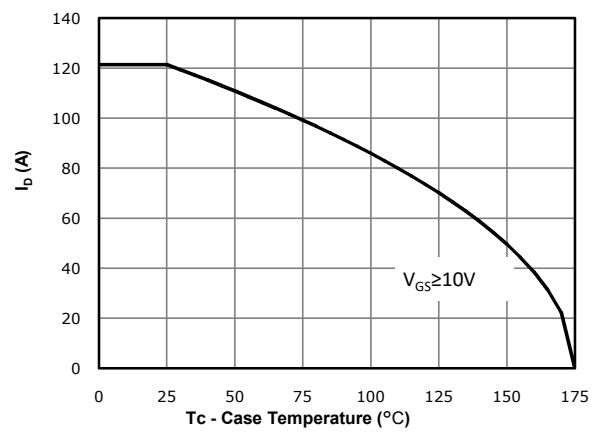


Fig 13: Safe Operating Area

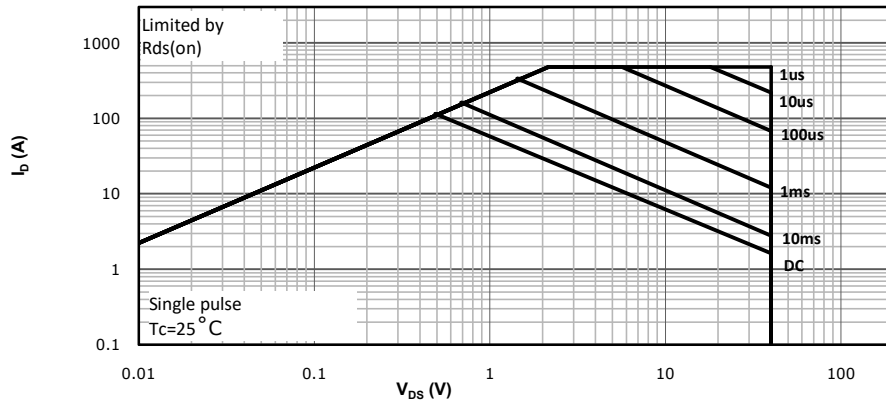
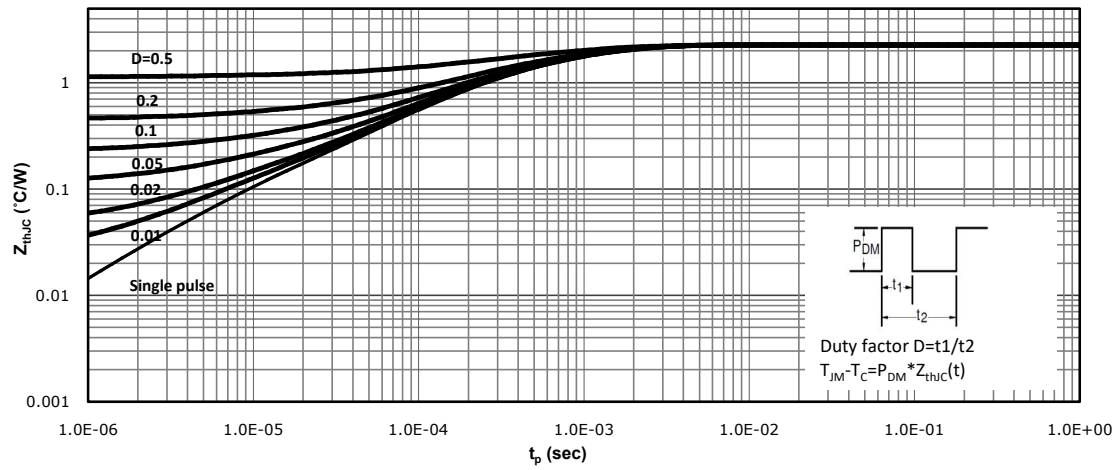
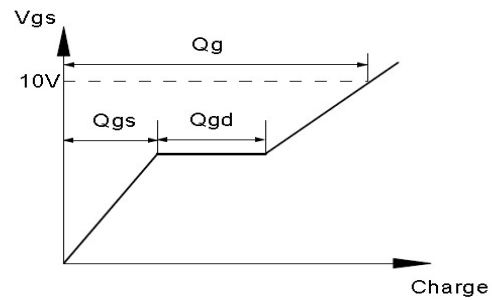
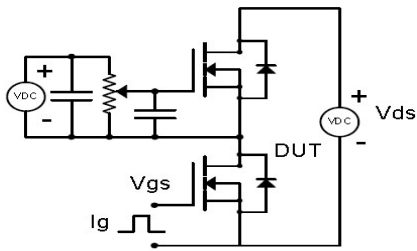


Fig 14: Max. Transient Thermal Impedance

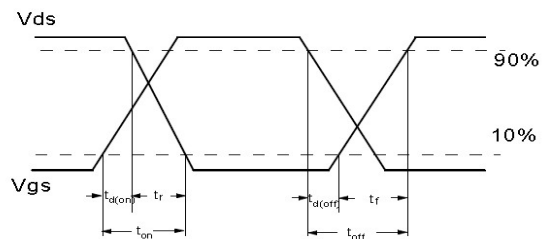
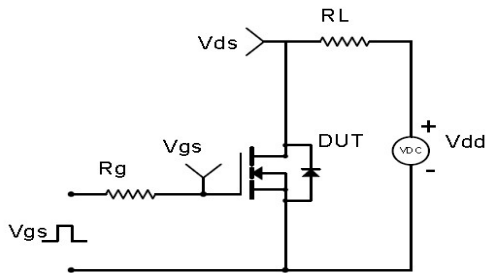


Test Circuit & Waveform

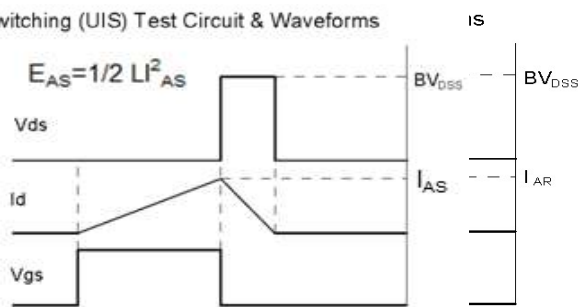
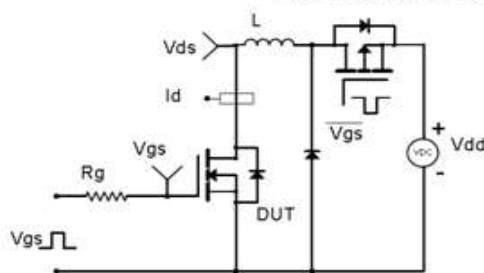
Gate Charge Test Circuit & Waveform



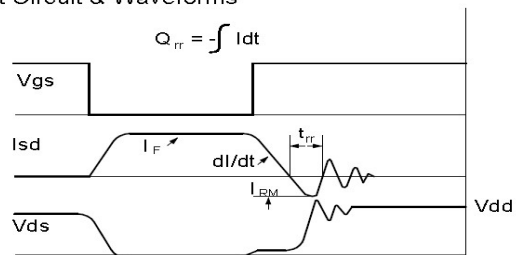
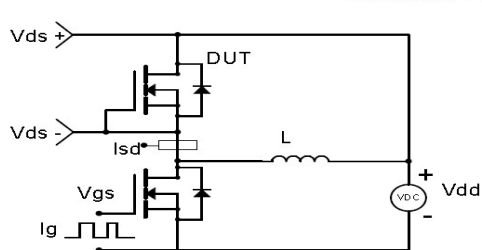
Resistive Switching Test Circuit & Waveforms



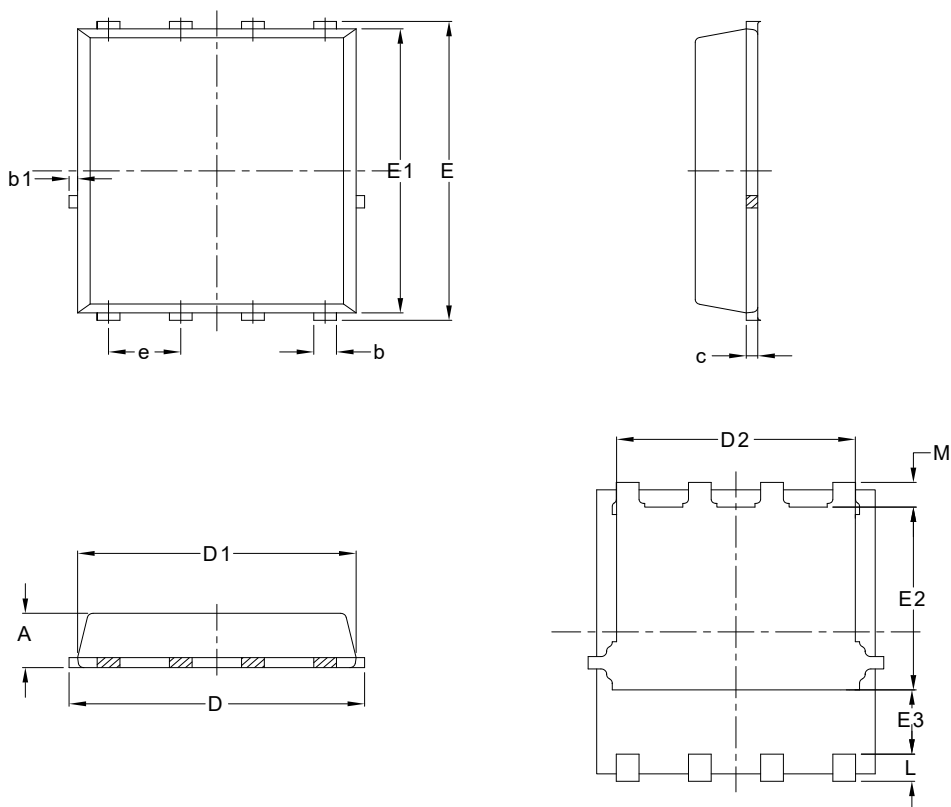
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: PDFN5x6 Type 5



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	NOM.	Max.
A	1.00	1.10	1.20	0.039	0.043	0.047
b	0.30	0.40	0.50	0.012	0.016	0.020
b1	0.02	0.15	0.22	0.001	0.006	0.009
c	0.15	0.200	0.35	0.006	0.008	0.014
D	4.95	5.15	5.35	0.195	0.203	0.211
D1	4.80	4.90	5.00	0.189	0.193	0.197
D2	4.00	4.20	4.40	0.157	0.165	0.173
E	5.95	6.05	6.25	0.234	0.238	0.246
E1	5.65	5.75	5.85	0.222	0.226	0.230
E2	3.50	3.70	3.90	0.138	0.146	0.154
E3	1.10	-	-	0.043	-	-
e	1.27 BSC			0.050 BSC		
L	0.40	0.55	0.70	0.016	0.022	0.028
M	0.35	0.50	0.65	0.000	0.020	0.026

Marking**NOTE:**

XAAAAAAAA-Y

X

—Assembly location code

AAAAAAA

—Assembly lot NO. last 7digits

Y

—Bin code

Revision History

Revision	Date	Major changes
1.0	2023/9/13	Release of preliminary version.
2.0	2025/3/6	1.Update Package name. 2.Delete Dynamic Characteristic parameters spec. 3.Update Fig5.

Disclaimer

CRM reserves the right to change any product or information in this Specification at any time without prior notice.

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