CRSM046N04N2Z

SkyMOS2 N-MOSFET 40V, 3.7mΩ, 70A

Features

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

Product Summary

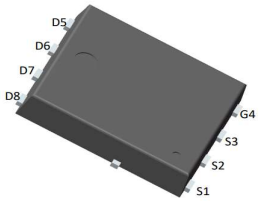
V_{DS}	40V
$R_{DS(on).typ}$	3.7mΩ
I_D	70A

100% DVDS Tested
100% Avalanche Tested

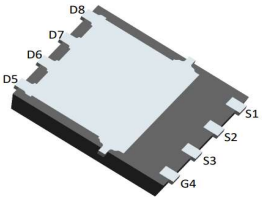
Applications

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

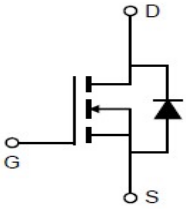
Top View



Bottom View



CRSM046N04N2Z



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSM046N04N2Z	046N04N2Z	DFN5*6	Tape&reel	N/A	N/A	4000pcs

Absolute Maximum Ratings

Parameter	**Symbol**	**Value**	**Unit**
Drain-source voltage	V_{DS}	40	V
Continuous drain current T_C = 25°C (Silicon limit) T_C = 25°C (Package limit) T_C = 100°C (Silicon limit)	I_D	 70 240 49	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	280	A
Avalanche energy, single pulse (IAS = 26A, Rg=50Ω)[1]	E_{AS}	101	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	58	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+175	°C
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)	Tsold	260	°C

※. Notes:
EAS is tested at starting Tj = 25℃, L = 0.3mH, IAS =26A, VGS = 10V.

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Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case (junction-heat spreader)	R_{thJC}	2.6	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	52	

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}	40	-	-	V	V_{GS}=0V, I_D=250uA
		40	-	-	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=250uA
Zero gate voltage drain current	I_{DSS}	- -	- -	1 100	μA	V_{DS}=40V,V_{GS}=0V T_j=25°C T_j=125°C
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	3.7	4.6	mΩ	VGS=10V, ID=40A T_j=25°C
Transconductance	g_{fs}	49	97	194	S	VDS=5V,ID=40A
Dynamic Characteristic						
Input Capacitance	C_{iss}	790	1580	3160	pF	V_{GS}=0V, V_{DS}=20V, f=1MHz
Output Capacitance	C_{oss}	217	434	868		
Reverse Transfer Capacitance	C_{rss}	-	26	130		
Gate Total Charge	Q_G	12	23	46	nC	V_{GS}=10V, V_{DS}=20V, I_D=40A,,f=1MHz
Gate-Source charge	Q_{gs}	-	10	20		
Gate-Drain charge	Q_{gd}	-	3	15		
Turn-on delay time	$t_{d(on)}$	-	9	17	ns	V_{GS}=10V, V_{DD}=20V, R_{G_ext}=3Ω, ID=40A
Rise time	t_r	12	24	48		
Turn-off delay time	$t_{d(off)}$	-	16	32		
Fall time	t_f	-	7	14		
Gate resistance	R_G	-	1.7	9	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}	-	0.9	1.4	V	V_{GS}=0V,I_{SD}=40A
Body Diode Reverse Recovery Time	t_{rr}	12	23	46	ns	I_F=40A,dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	6	11	22	nC	

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Typical Performance Characteristics

Fig 1: Output Characteristics

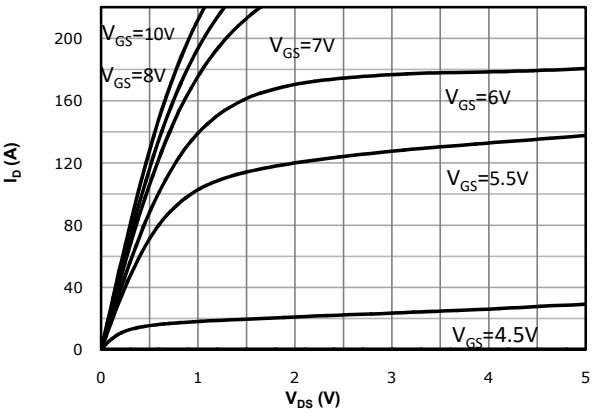


Fig 2: Transfer Characteristics

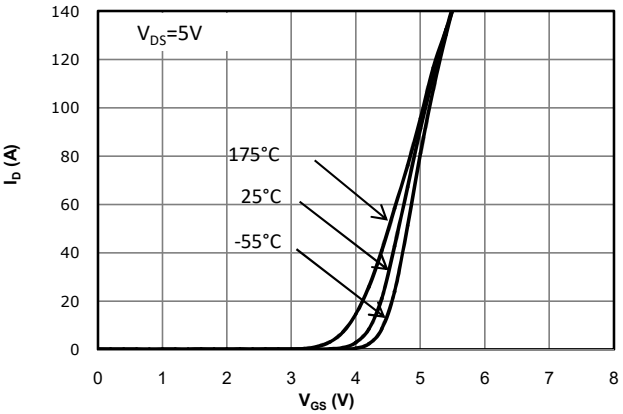


Fig 3: Rds(on) vs Drain Current and Gate Voltage

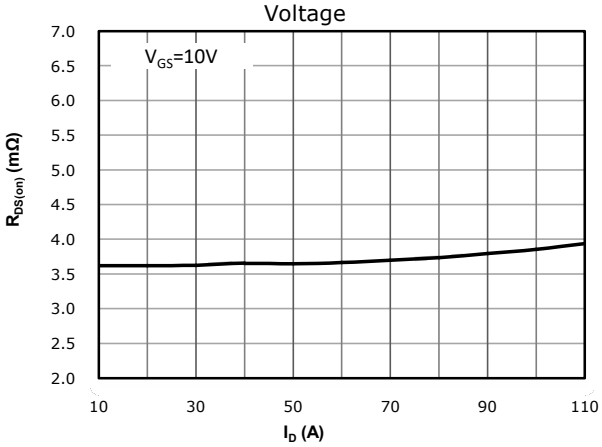


Fig 4: Rds(on) vs Gate Voltage

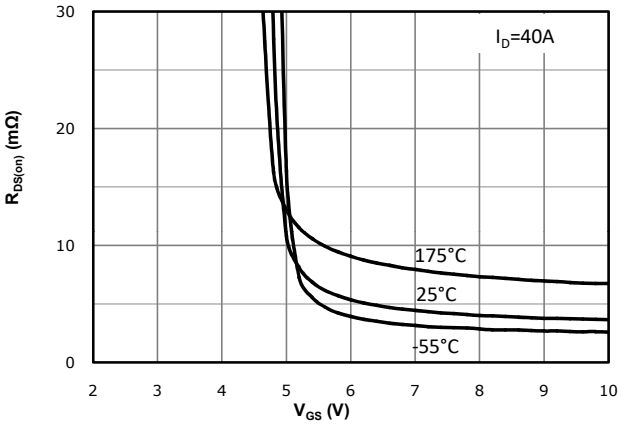


Fig 5: Rds(on) vs. Temperature

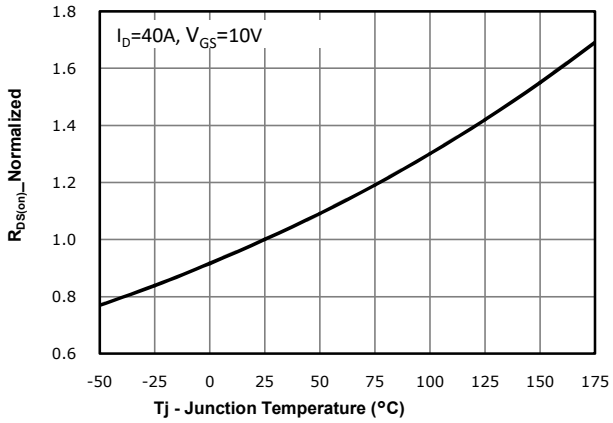
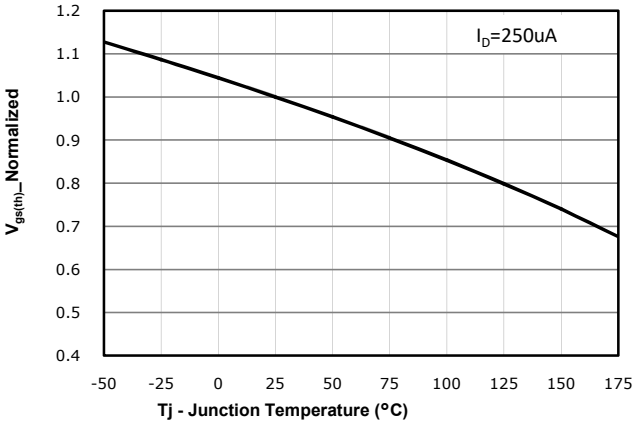


Fig 6: Vgs(th) vs. Temperature



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Fig 7: BVdss vs. Temperature

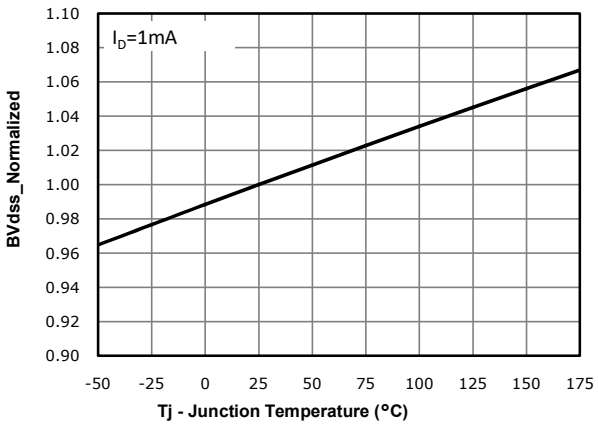


Fig 8: Capacitance Characteristics

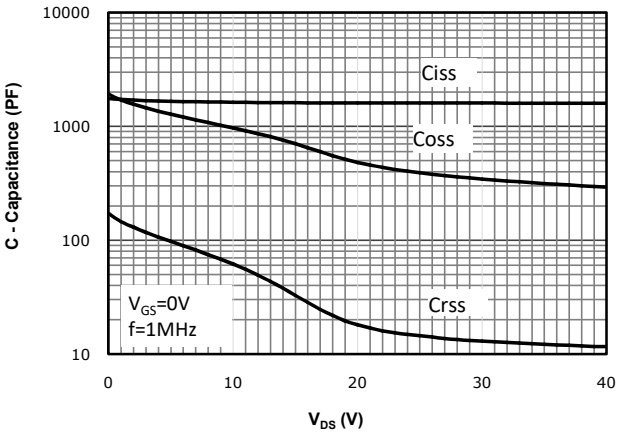


Fig 9: Gate Charge Characteristics

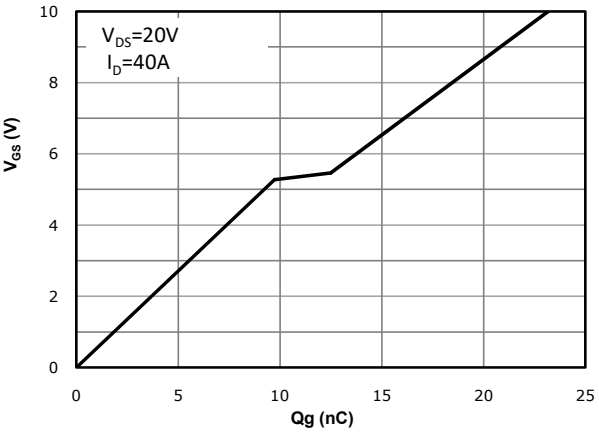


Fig 10: Body-diode Forward Characteristics

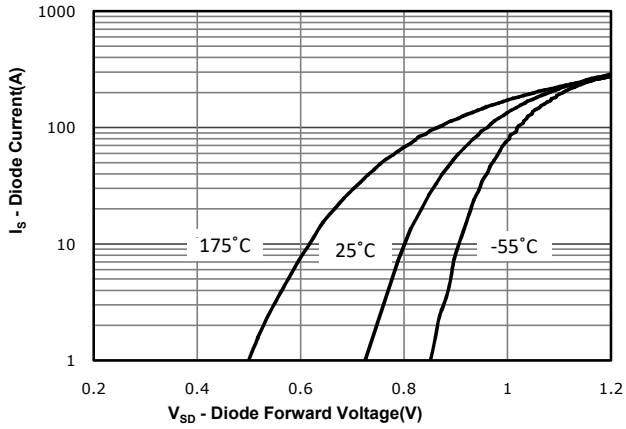


Fig 11: Power Dissipation

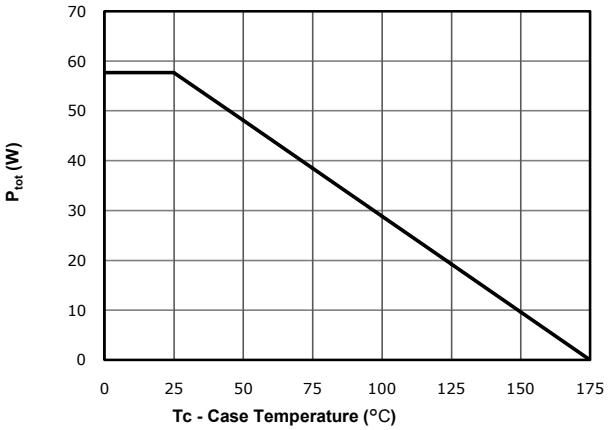
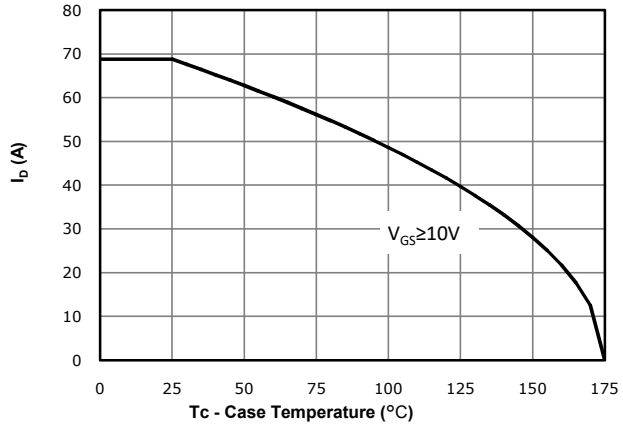


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

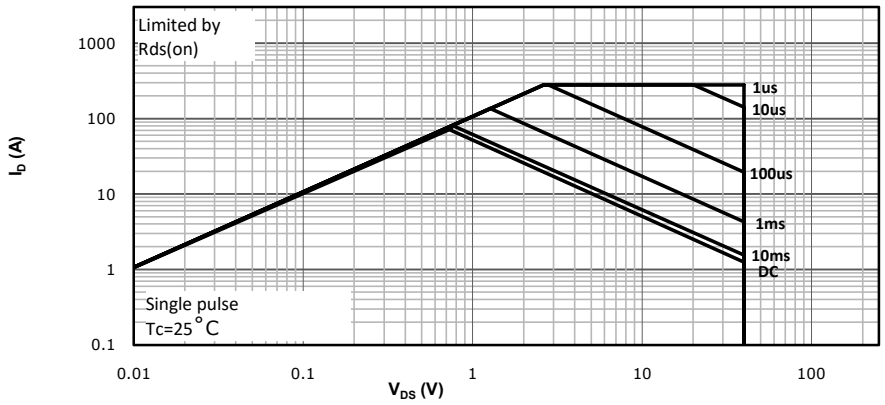
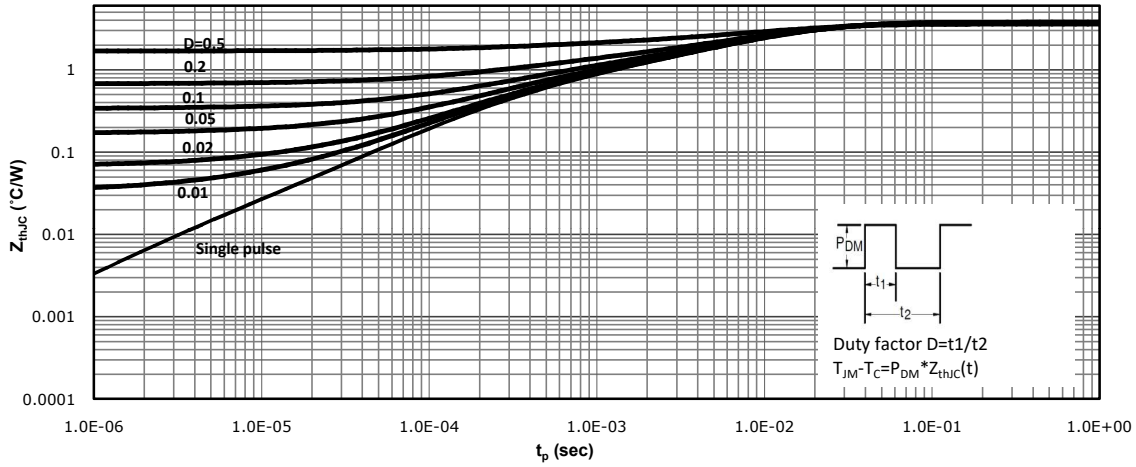


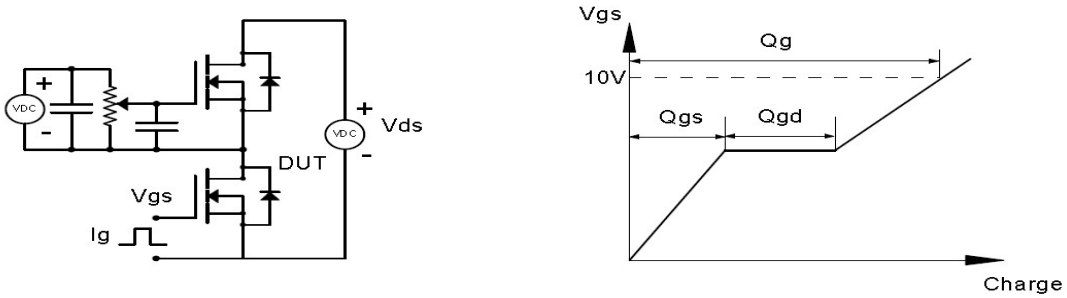
Fig 14: Max. Transient Thermal Impedance



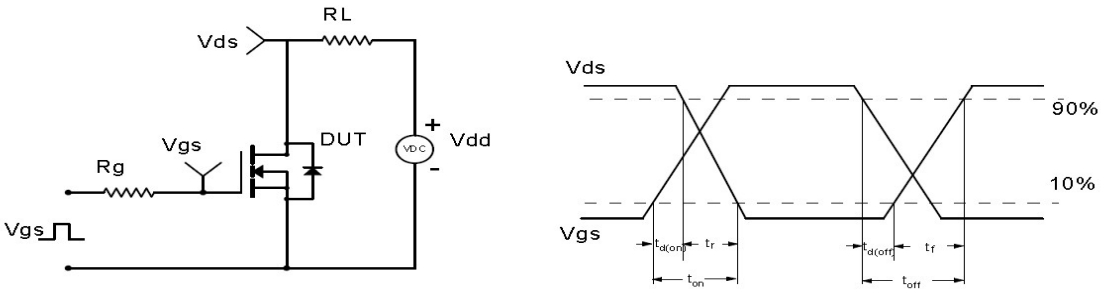
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Test Circuit & Waveform

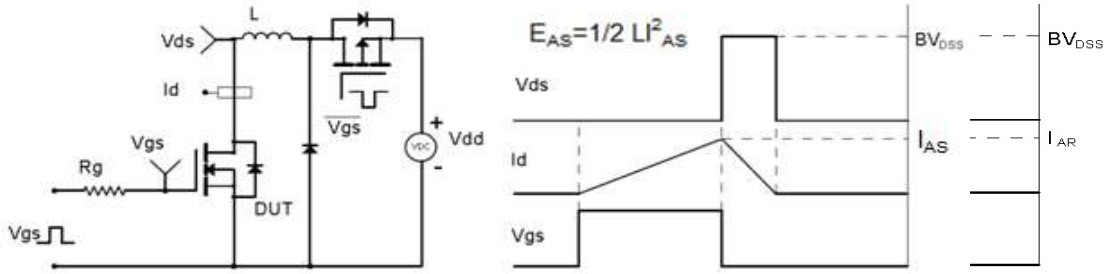
Gate Charge Test Circuit & Waveform



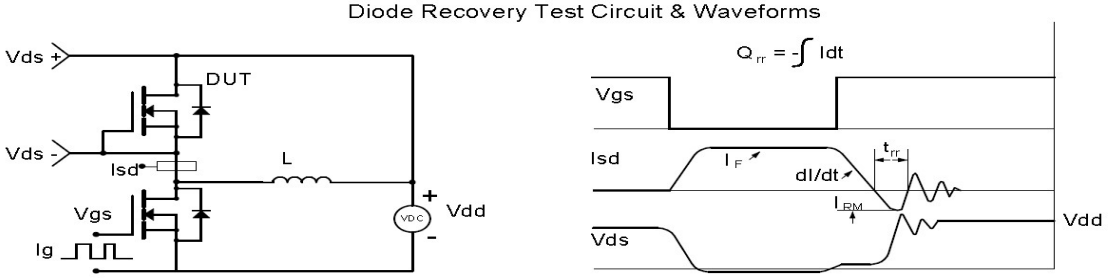
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

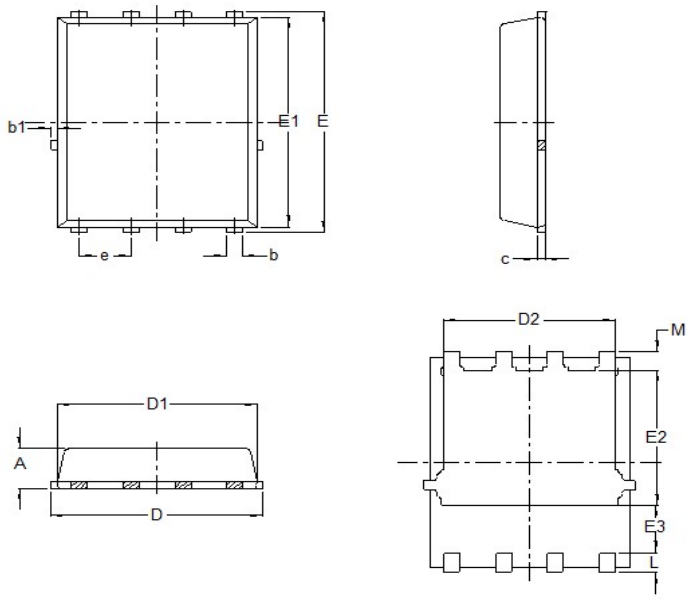


Diode Recovery Test Circuit & Waveforms



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Package Outline: DFN5*6 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

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Marking



NOTE:
XAAAAAAA -Y

X	—Assembly location code
AAAAAAA	—Assembly lot NO. last 7digits
Y	—Bin code

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Revision History

Revision	Date	Major changes
1.0	2023/9/13	Release of preliminary version.

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