CRSM054N04N2DZ

SkyMOS2 N-MOSFET 40V, 5.1mΩ, 50A

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

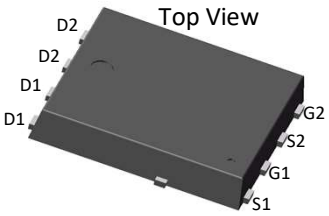
Product Summary

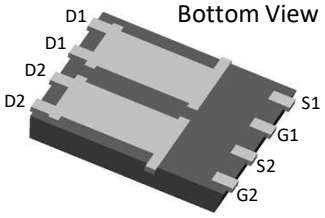
V_{DS}	40V
$R_{DS(on).typ}$	5.1mΩ
I_D	50A

100% DVDS Tested
100% Avalanche Tested

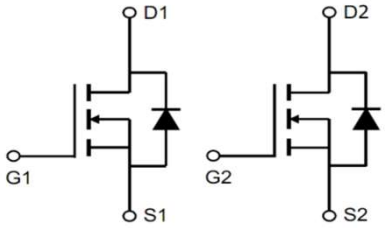
Applications

- Motor control and drive
- Battery management System





CRSM054N04N2DZ



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSM054N04N2DZ	054N04N2DZ	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 T_C = 25°C (Silicon limit) T_C = 100°C (Silicon limit)	I_D	 70 52	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	200	A
Avalanche energy, single pulse (I_D = 25A, Rg=25Ω)[1]	E_{AS}	93	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	47	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:
1.EAS is tested at starting Tj = 25℃, L = 0.3mH, IAS =25A, Vds = 40V.

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Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	3.2	°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}	40	-	-	V	V_{GS}=0V, I_D=250uA
		40	-	-	V	V_{GS}=0V, I_D=1mA
Gate threshold voltage	$V_{GS(th)}$	2	3	4	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	$R_{DS(on)}$		5.1	6.4	mΩ	VGS=10V, ID=35A
Transconductance	g_{fs}	-	85	-	S	V_{DS}=5V, I_D=35A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	1728	-	pF	VGS=0V, VDS=20V, f=1MHz
Output Capacitance	C_{oss}	-	577	-		
Reverse Transfer Capacitance	C_{rss}	-	20	-		
Gate Total Charge	Q_G	-	25	-	nC	VGS=10V, VDS=20V, ID=35A, f=1MHz
Gate-Source charge	Q_{gs}	-	11	-		
Gate-Drain charge	Q_{gd}	-	2.6	-		
Turn-on delay time	$t_{d(on)}$	-	9	-	ns	Vds=20V Id=35A Rg=3Ω Vgs=10V
Rise time	t_r	-	23	-		
Turn-off delay time	$t_{d(off)}$	-	19	-		
Fall time	t_f	-	8	-		
Gate resistance	R_G	-	2	-	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.		
Diode continous forward current	Is	-	-	50	A	Tc = 25°C
Diode pulse current	Is pulse	-	-	200	A	Tc = 25°C
Body Diode Forward Voltage	V_{SD}	-	0.9	1.4	V	V_{GS}=0V, I_{SD}=35A
Body Diode Reverse Recovery Time	t_{rr}	-	28	-	ns	I_F=35A,dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	14	-	nC	

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Typical Performance Characteristics

Fig 1: Output Characteristics

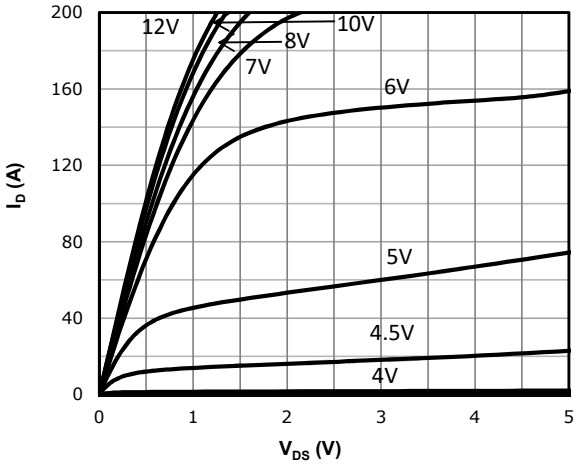


Fig 2: Transfer Characteristics

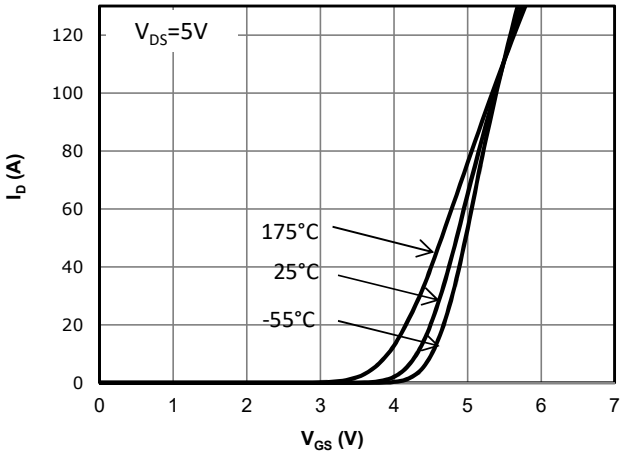


Fig 3: Rds(on) vs Drain Current and Gate Voltage

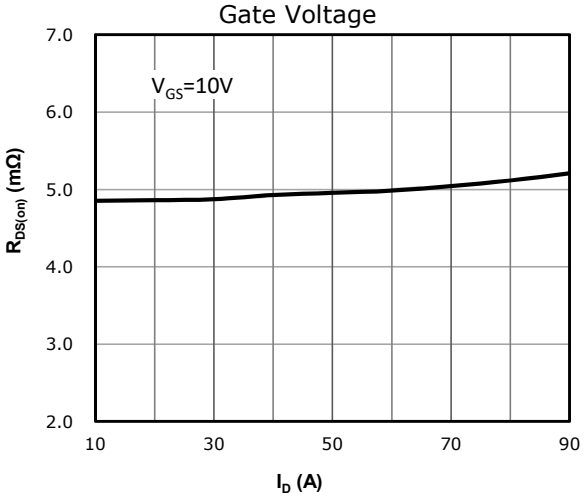


Fig 4: Rds(on) vs Gate Voltage

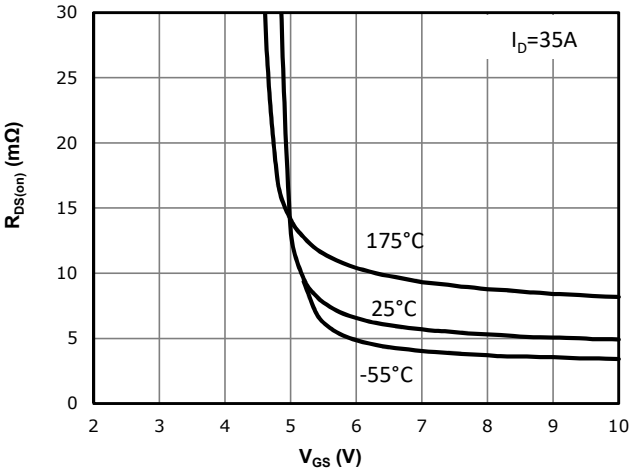


Fig 5: Rds(on) vs. Temperature

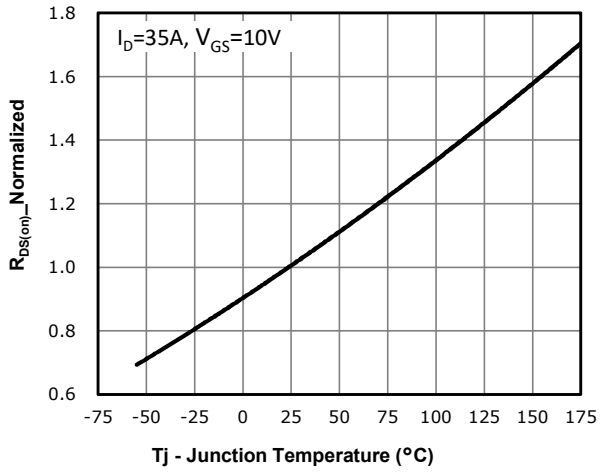
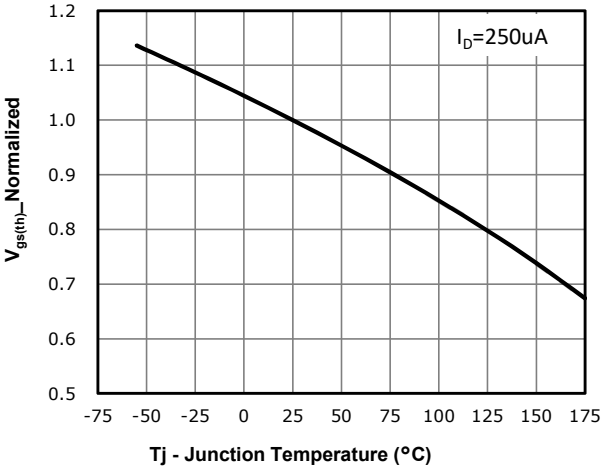


Fig 6: Vgs(th) vs. Temperature



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Fig 7: BVdss vs. Temperature

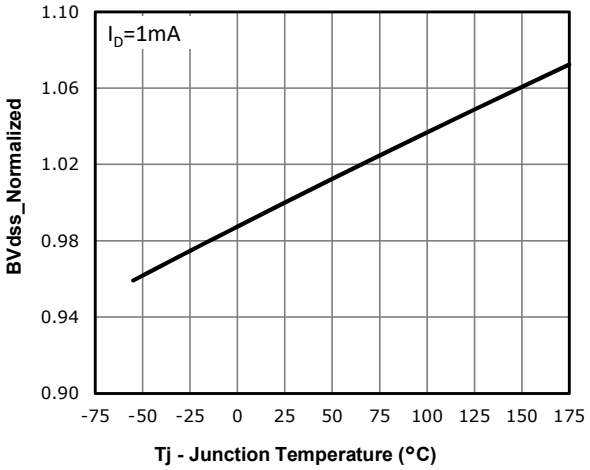


Fig 8: Capacitance Characteristics

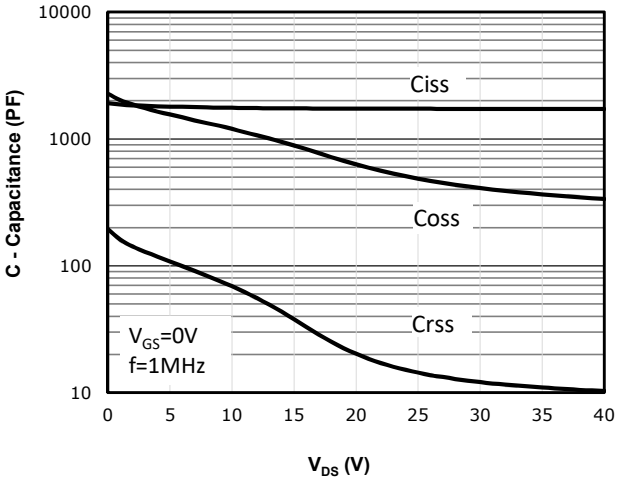


Fig 9: Gate Charge Characteristics

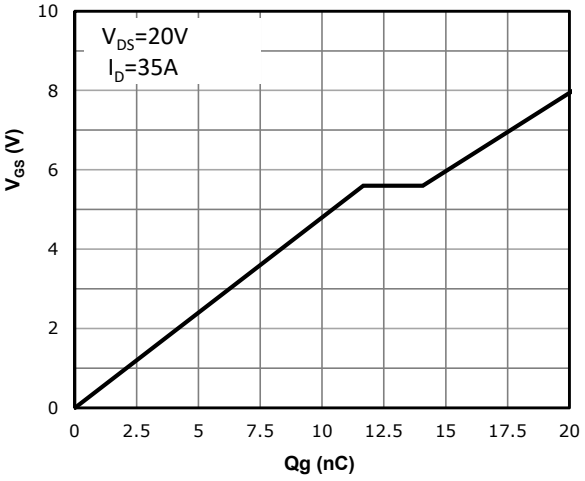


Fig 10: Body-diode Forward Characteristics

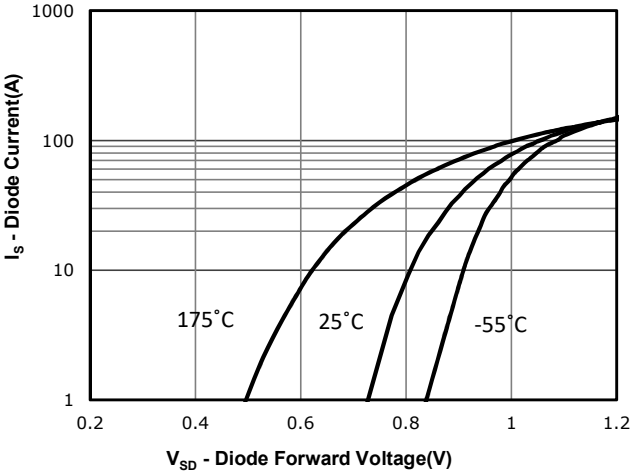


Fig 11: Power Dissipation

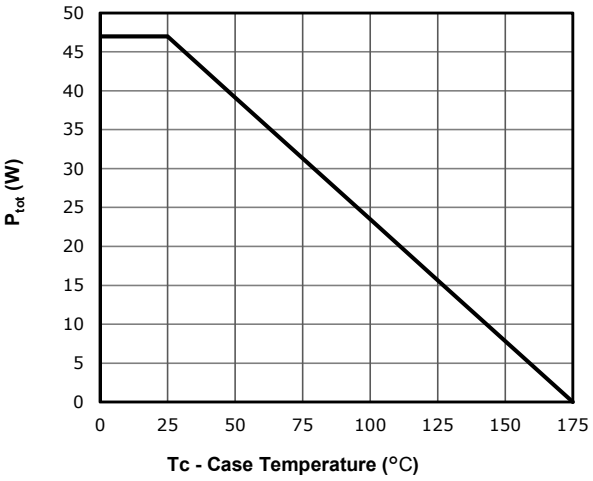
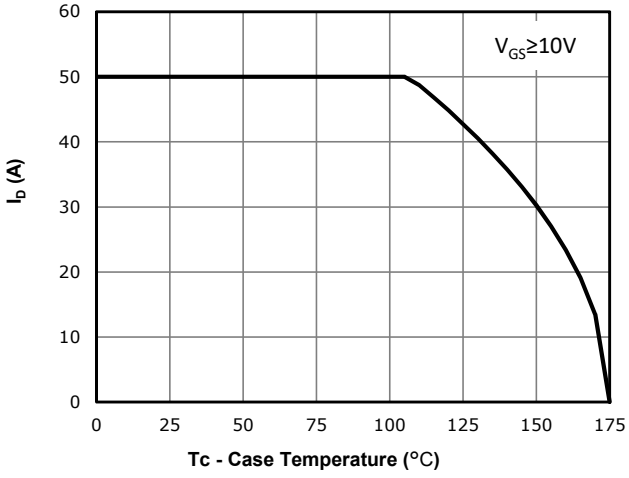


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

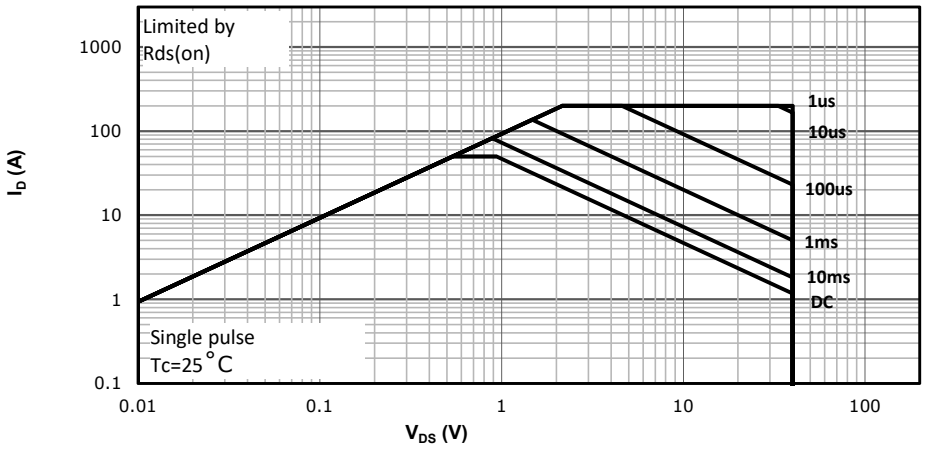
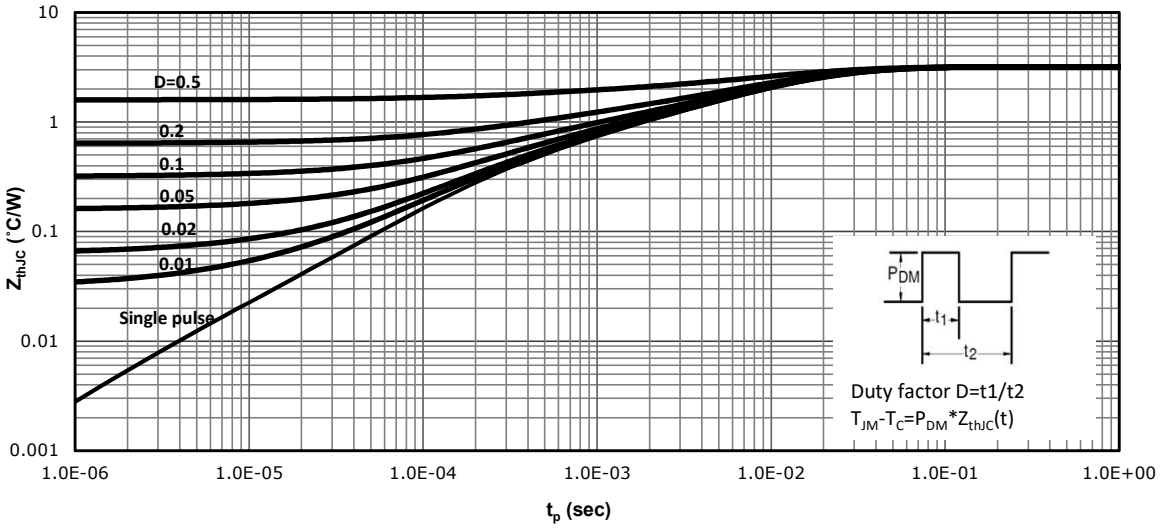


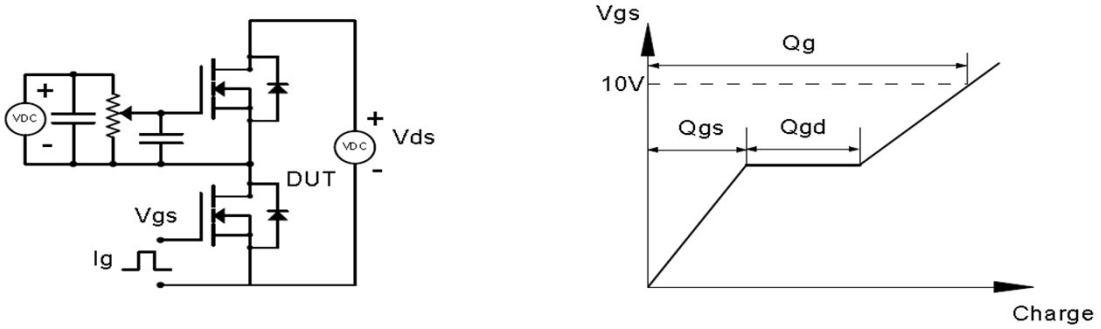
Fig 14: Max. Transient Thermal Impedance



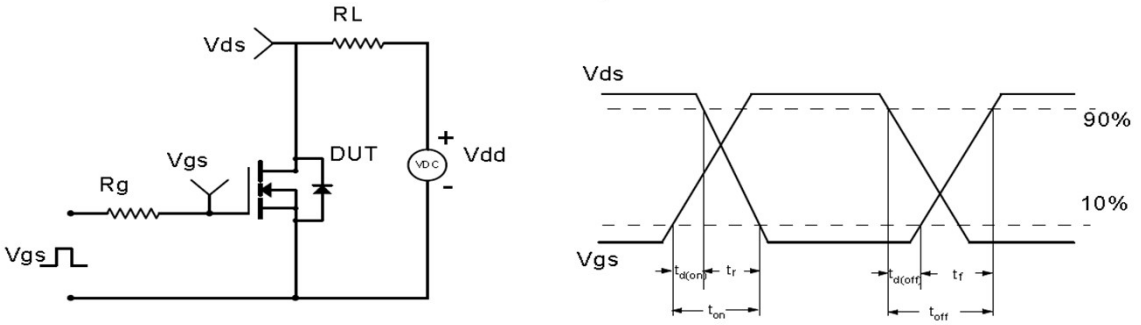
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Test Circuit & Waveform

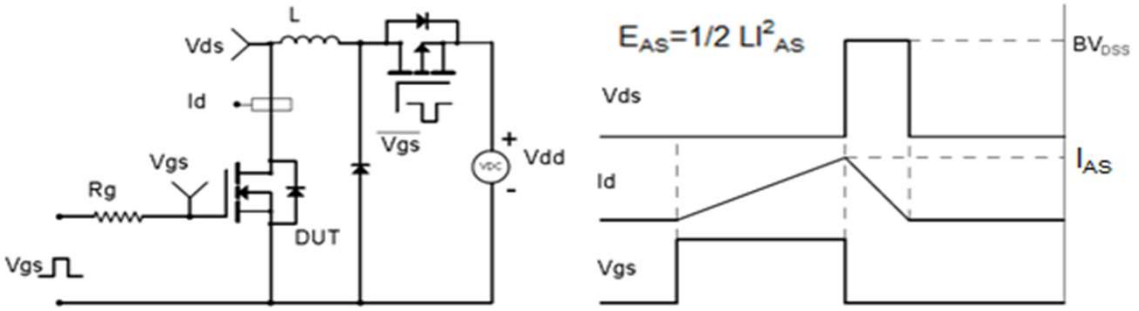
Gate Charge Test Circuit & Waveform



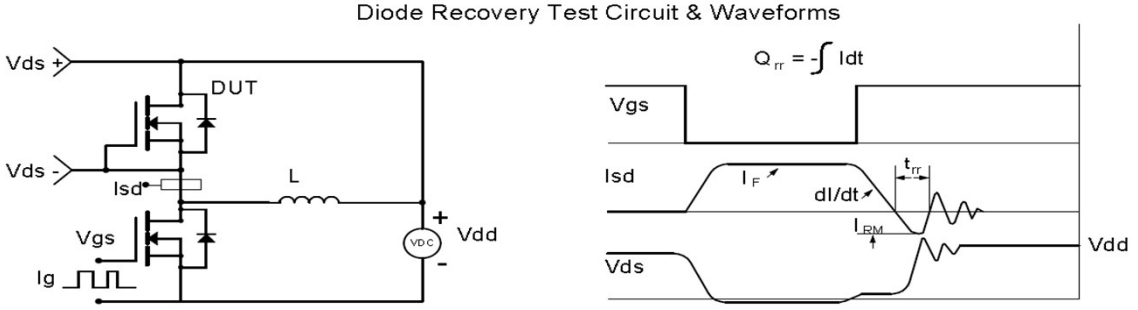
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

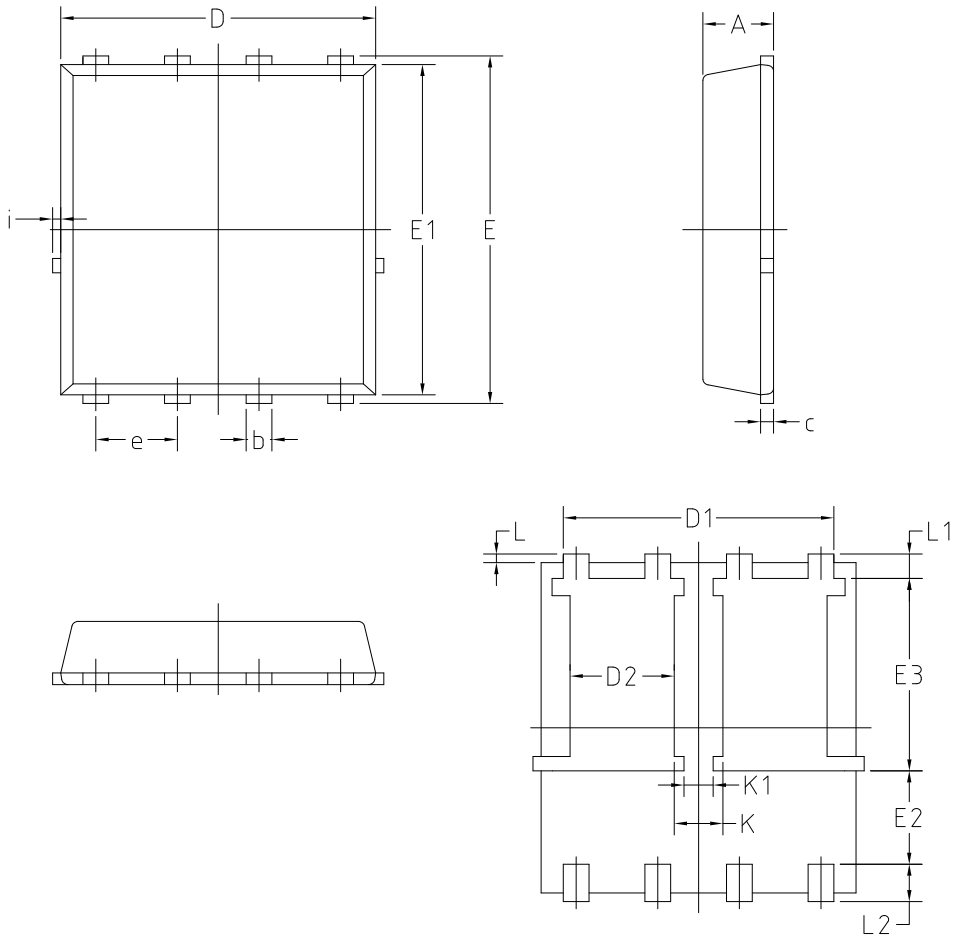


Diode Recovery Test Circuit & Waveforms



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Package Outline: PDFN5x6 Dual Pad Type 6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.00	1.20	0.039	0.047
b	0.30	0.50	0.012	0.020
c	0.203 BSC		0.008 BSC	
D	4.80	5.00	0.189	0.197
D1	4.06	4.36	0.160	0.172
D2	1.47	1.77	0.058	0.070
E	5.90	6.20	0.232	0.244
E1	5.65	5.85	0.222	0.230
E2	1.45	-	0.057	-
E3	3.20	3.50	0.126	0.138
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.002	0.010
L1	0.325	0.525	0.013	0.021
L2	0.50	0.80	0.020	0.031
i	-	0.20	-	0.008
K	0.61	0.91	0.024	0.036
K1	0.31	0.60	0.012	0.024

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Marking



NOTE:
XAAAAAAA-Y

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

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Revision History

Revision	Date	Major changes
1.0	2023/8/26	Release of Preliminary version.
2.0	2024/5/6	Add Is、 Is pulse.
2.1	2025/3/9	1.Change package name. 2.Delete Dynamic Characteristic parameters spec. 3.Update Fig5. 4.Update 25°C Silicon limit.

Disclaimer

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