华润微电子(重庆)有限公司

CRSM045N04N2Z

SkyMOS2 N-MOSFET 40V, 3.7mΩ, 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

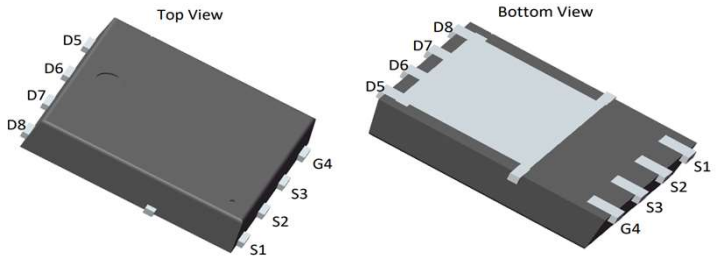
Product Summary

V_{DS}	40V
$R_{DS(on).typ}$	3.7mΩ
I_D	50A

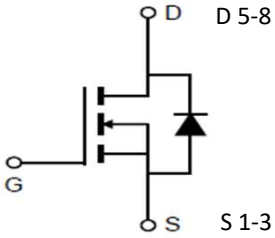
100% DVDS Tested
100% Avalanche Tested

Applications

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



CRSM045N04N2Z



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSM045N04N2Z	045N04N2Z	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 49	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	200	A
Avalanche energy, single pulse (IAS = 21A, Rg=50Ω)[1]	E_{AS}	66	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	38	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 =21A, VGS = 10V.

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Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case (junction-heat spreader)	R_{thJC}	3.9	°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	$V_{GS(th)}$	2.0	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	4.5	mΩ	VGS=10V, ID=40A T_j=25°C
Transconductance	g_{fs}	-	130	-	S	VDS=5V,ID=40A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	2110	-	pF	V_{GS}=0V, V_{DS}=20V, f=1MHz
Output Capacitance	C_{oss}	-	700	-		
Reverse Transfer Capacitance	C_{rss}	-	22	-		
Gate Total Charge	Q_G	-	30	-	nC	V_{GS}=10V, V_{DS}=20V, I_D=40A,,f=1MHz
Gate-Source charge	Q_{gs}	-	12	-		
Gate-Drain charge	Q_{gd}	-	4	-		
Turn-on delay time	$t_{d(on)}$	-	8	-	ns	V_{GS}=10V, V_{DD}=20V, R_{G_ext}=3Ω, ID=40A
Rise time	t_r	-	24	-		
Turn-off delay time	$t_{d(off)}$	-	13	-		
Fall time	t_f	-	7	-		
Gate resistance	R_G	-	1.8	-	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}=40A
Body Diode Reverse Recovery Time	t_{rr}	-	30	-	ns	I_F=40A,dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	15	-	nC	

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Typical Performance Characteristics

Fig 1: Output Characteristics

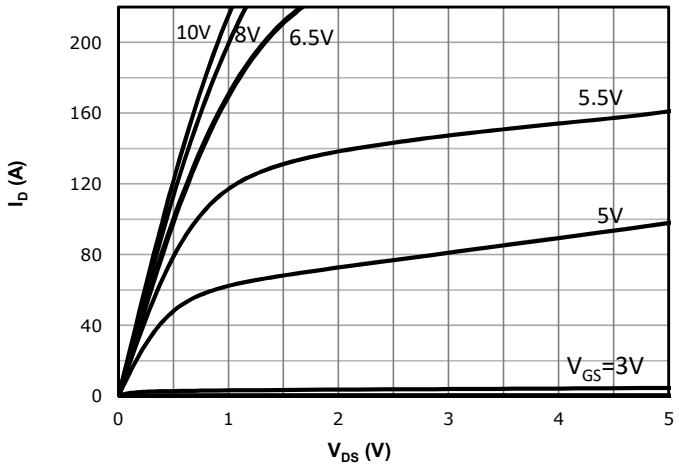


Fig 2: Transfer Characteristics

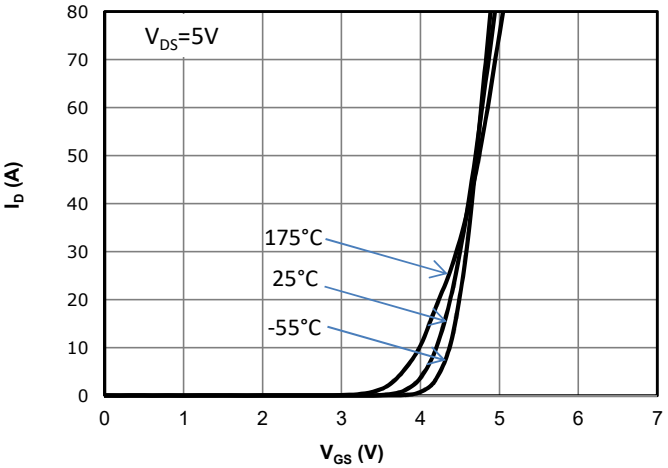


Fig 3: Rds(on) vs Drain Current and Gate Voltage

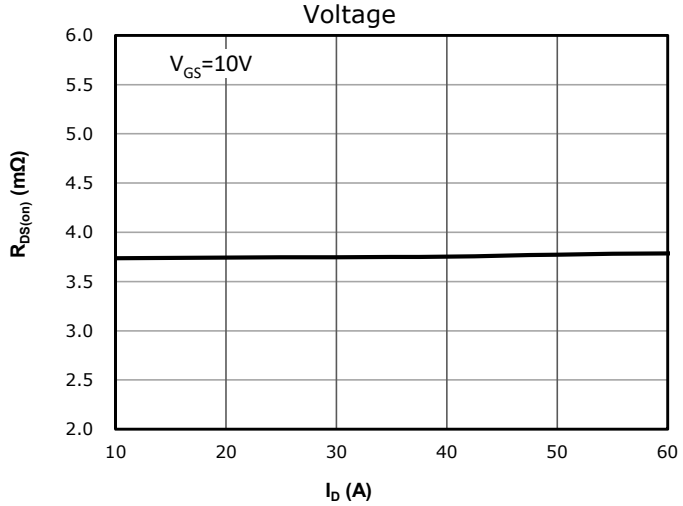


Fig 4: Rds(on) vs Gate Voltage

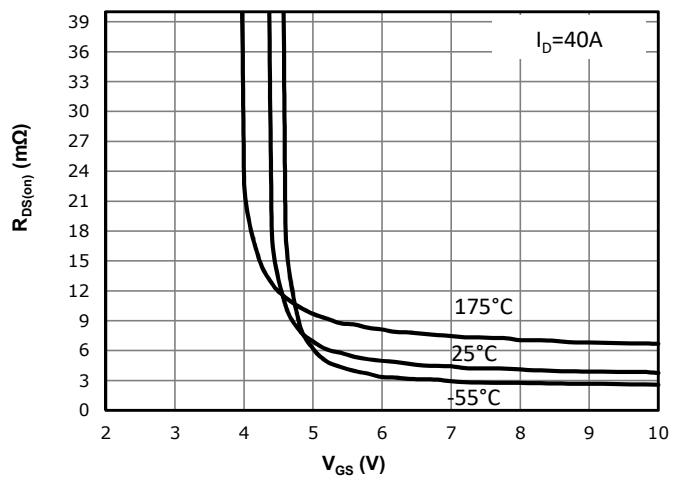


Fig 5: Rds(on) vs. Temperature

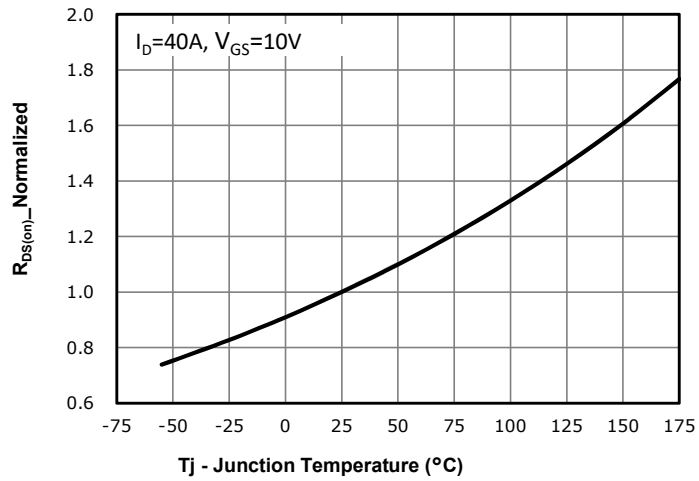
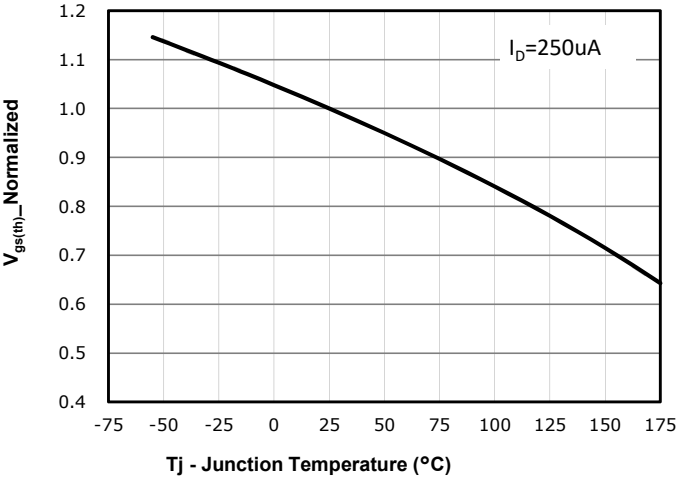


Fig 6: Vgs(th) vs. Temperature



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Fig 7: BVdss vs. Temperature

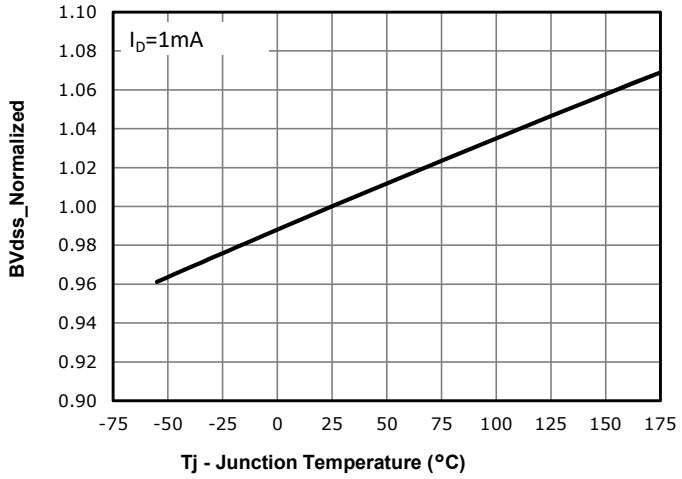


Fig 8: Capacitance Characteristics

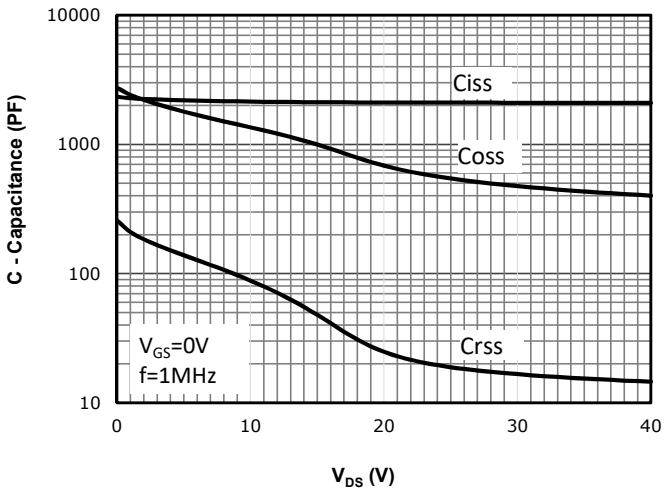


Fig 9: Gate Charge Characteristics

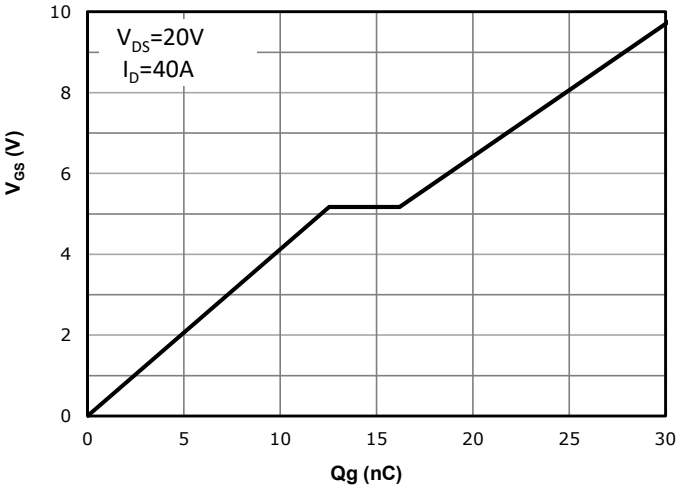


Fig 10: Body-diode Forward Characteristics

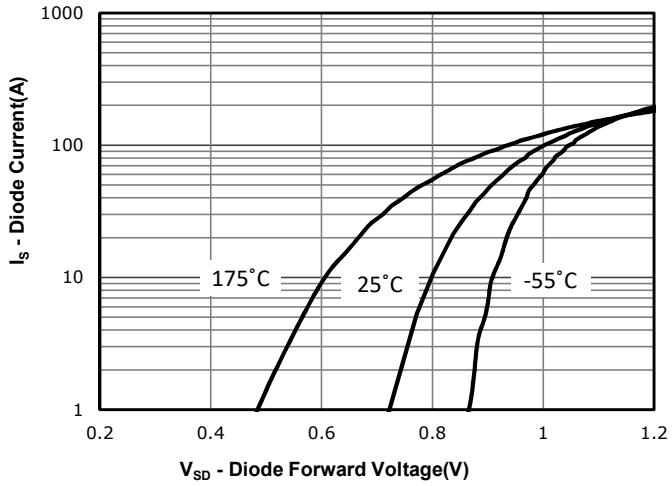


Fig 11: Power Dissipation

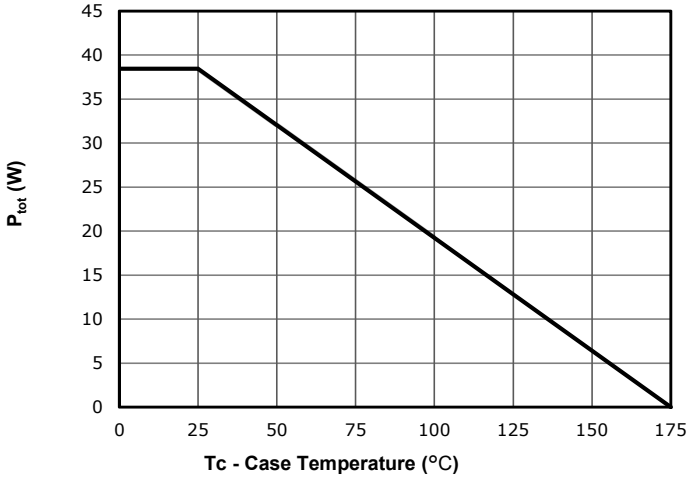
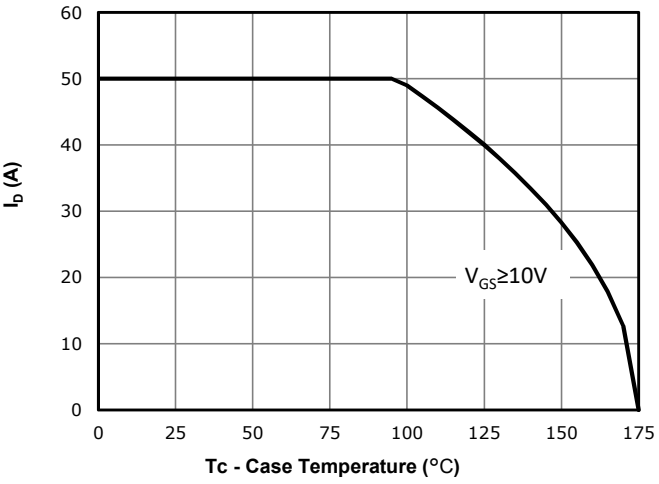


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

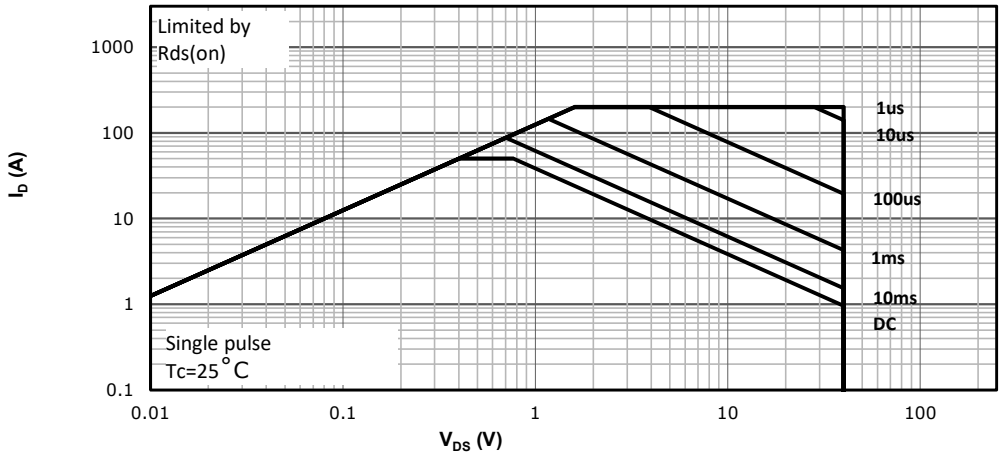
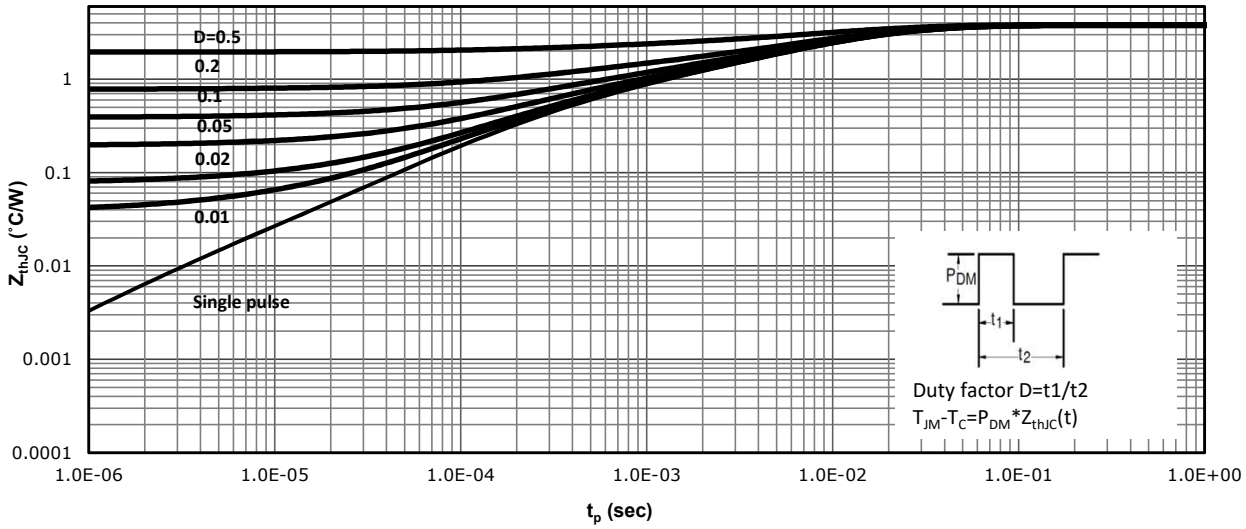


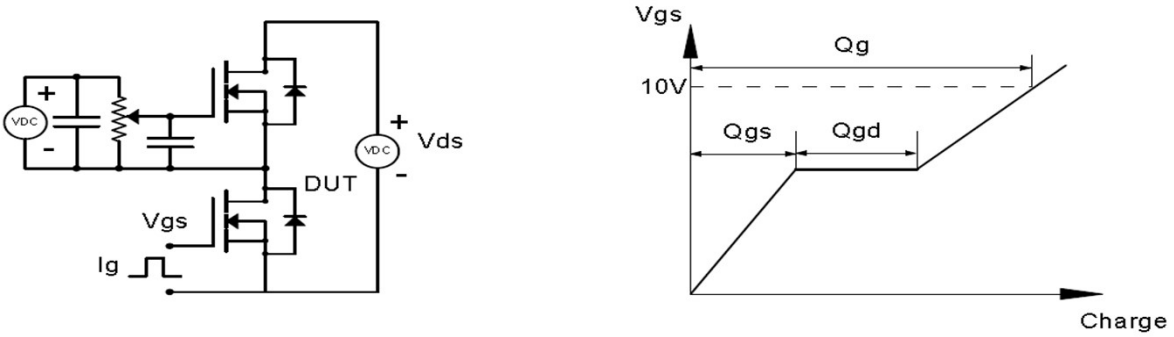
Fig 14: Max. Transient Thermal Impedance



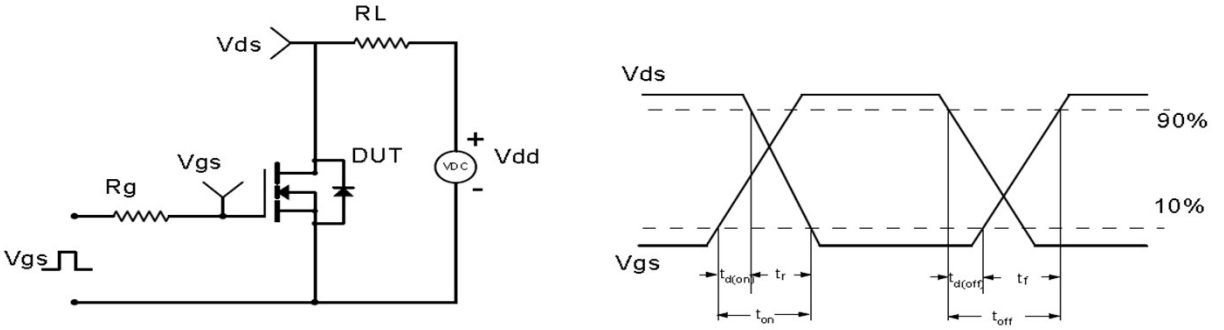
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Test Circuit & Waveform

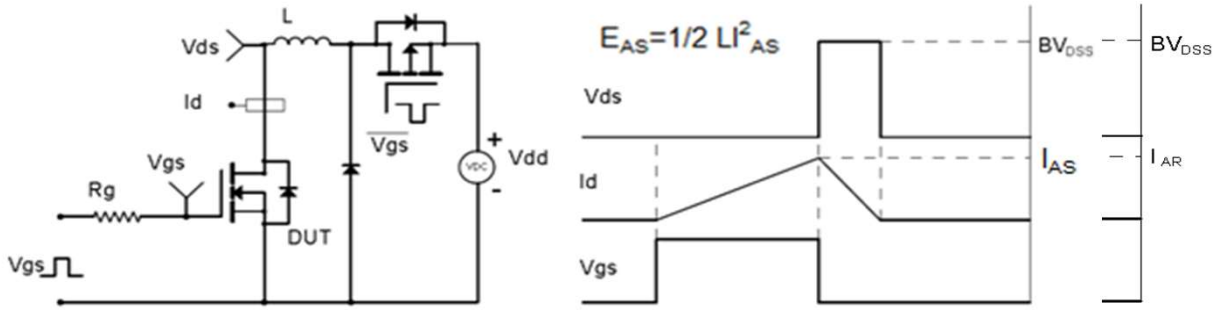
Gate Charge Test Circuit & Waveform



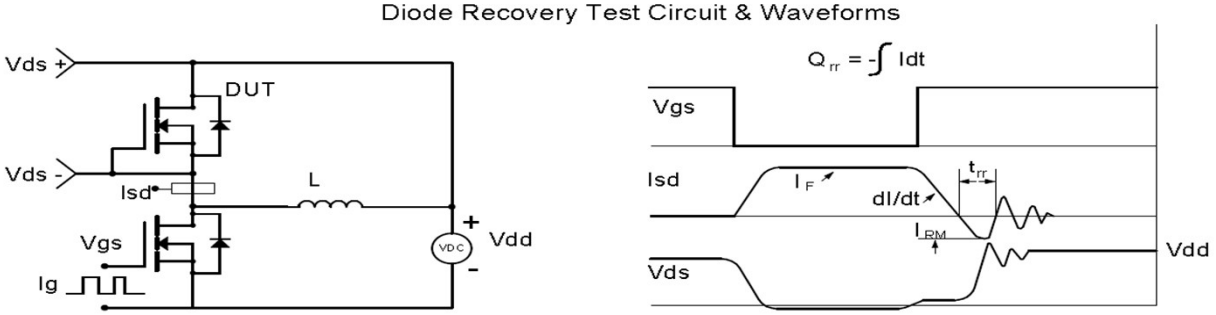
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

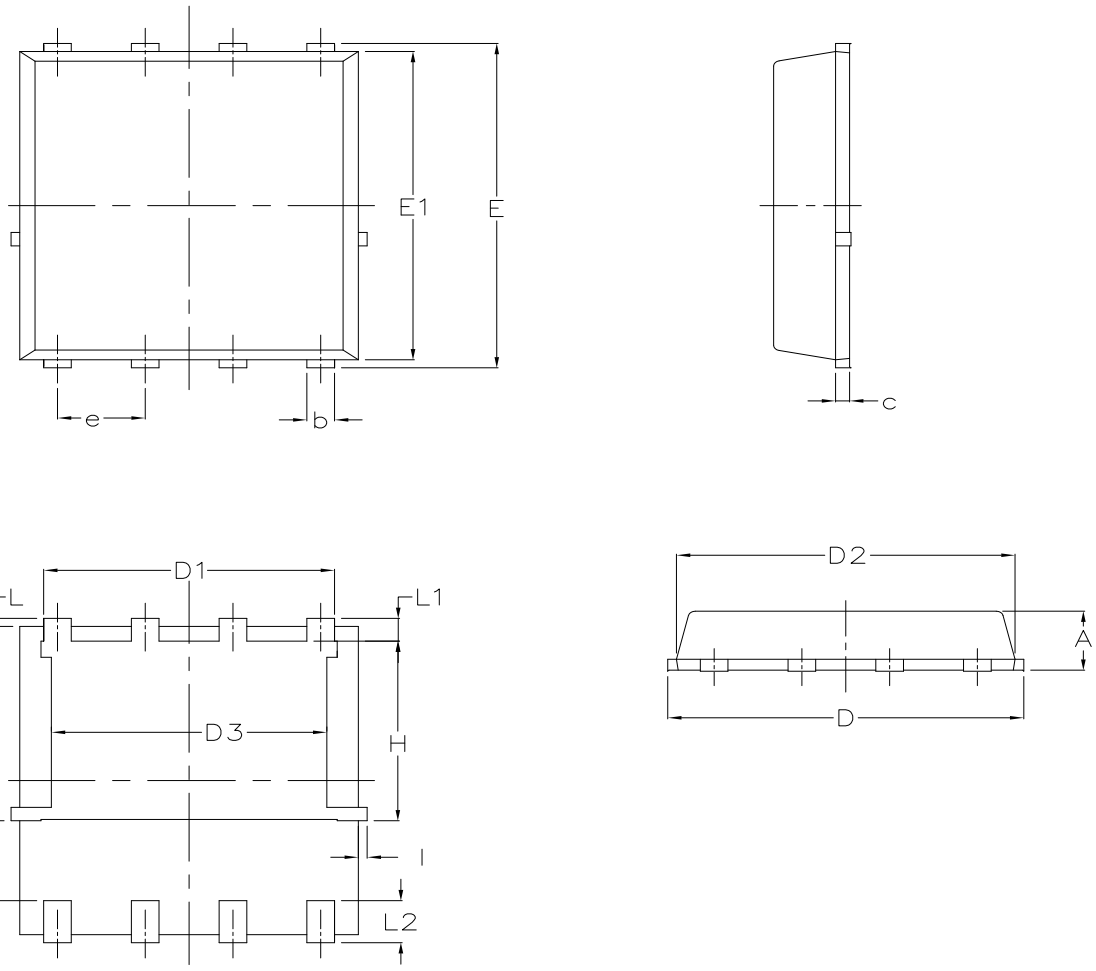


Diode Recovery Test Circuit & Waveforms



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Package Outline: PDFN5x6 Type P



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	NOM.	Max.	Min.	NOM.	Max.
A	0.90	1.10	1.20	0.035	0.043	0.047
b	0.31	0.41	0.51	0.012	0.016	0.020
c	0.15	0.20	0.30	0.006	0.008	0.012
D	4.80	4.98	5.15	0.189	0.196	0.203
D1	3.91	4.22	4.36	0.154	0.166	0.172
D2	4.80	4.90	5.00	0.189	0.193	0.197
D3	3.85	4.00	4.15	0.152	0.157	0.163
E	5.90	6.05	6.15	0.232	0.238	0.242
E1	5.65	5.76	5.85	0.222	0.227	0.230
E2	1.10	-	-	0.043	-	-
e	1.27 BSC			0.050 BSC		
L	0.05	0.15	0.25	0.002	0.006	0.010
L1	0.38	0.43	0.50	0.015	0.017	0.020
L2	0.51	0.79	0.86	0.020	0.031	0.034
H	3.25	3.35	3.58	0.128	0.132	0.141
I	0.00	-	0.18	0.000	-	0.007

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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	2023/8/1	Release of preliminary version.
1.1	2024/9/21	Add Is and Is pulse.
2.0	2025/3/6	1.Update Package name 2.Delete Dynamic Characteristic parameters spec 3.Update 25°C Silicon limit.

Disclaimer

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