Product Summary

BV_{DSS}	$R_{DS(ON)}$ Typ.	I_D T_A = +25°C
-20V	37mΩ @ V_{GS} = -4.5V	-3.4A
	49mΩ @ V_{GS} = -2.5V	-2.9A

Description and Applications

This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Battery managements
- Load switches
- Battery protections

Features and Benefits

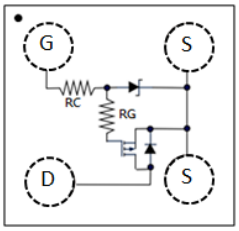
- Low Q_g & Q_{gd}
- Small Footprint
- Low Profile 0.45mm Height
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Mechanical Data

- Package: X1-DSN1010-4
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal: Finish - SnAg over Cu Pillar
  Solder Cap Material: SnAg (Ag: 2.0+/-0.5%) e1
- Terminal Connections: See Diagram Below
- UBM Size:320μm
- Weight:0.0012 grams (Approximate)

X1-DSN1010-4 (Type C)





Top View
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMP2042UCP4-7	X1-DSN1010-4 (Type C)	3000	Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



2M= Product Type Marking Code
YW = Date Code Marking
Y or $\overline{Y}$ = Year (ex: 2 = 2022)
W or $\overline{W}$ = Week (ex: a = week 27; z represents week 52 and 53)

Date Code Key

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Code	2	3	4	5	6	7	8	9	0	1	2	3

Week	1-26	27-52	53
Code	A-Z	a-z	z

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Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	-20	V
Gate-Source Voltage	V_{GSS}	-6	V
Continuous Drain Current (Note 6) V_{GS} = -4.5V	I_D	-3.4	A
Continuous Drain Current (Note 6) V_{GS} = -2.5V	I_D	-2.9	A
Pulsed Drain Current (Note 5)	I_{DM}	-16	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P_D	0.86	W
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 6)	$R_{\theta JA}$	145.7	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-20	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	-1	µA	V_{DS} = -16V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	-100	nA	V_{GS} = -6V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.4	-0.8	-1.2	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	37	48	mΩ	V_{GS} = -4.5V, I_D =-1A
		—	49	65		V_{GS} = -2.5V, I_D = -1A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.0	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	218	—	pF	V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	148	—		
Reverse Transfer Capacitance	C_{rss}	—	11	—		
Series Gate Resistance	R_g	—	20	—	Ω	f = 1MHz, V_{GS} = 0V, V_{DS} = 0V
Series Clamp Resistance	R_C	—	5000	—		
Total Gate Charge	Q_g	—	2.5	—	nC	V_{GS} = -4.5V, V_{DS} = -10V, I_D =-1A
Gate-Source Charge	Q_{gs}	—	0.4	—		
Gate-Drain Charge	Q_{gd}	—	0.4	—		
Gate Charge at V_{TH}	$Q_{g(TH)}$	—	0.2	—		
Turn-On Delay Time	$t_{D(ON)}$	—	0.6	—	µs	V_{DS} = -10V, V_{GS} = -2.5V, R_g = 10Ω, I_D = -1A
Turn-On Rise Time	t_R	—	0.8	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	1.4	—		
Turn-Off Fall Time	t_F	—	0.8	—		

Notes:
5. Repetitive rating, pulse width limited by junction temperature.
6. Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.

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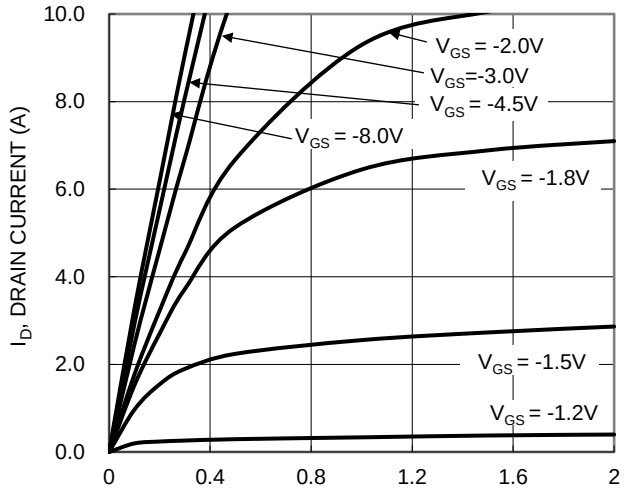


Figure 1. Typical Output Characteristic

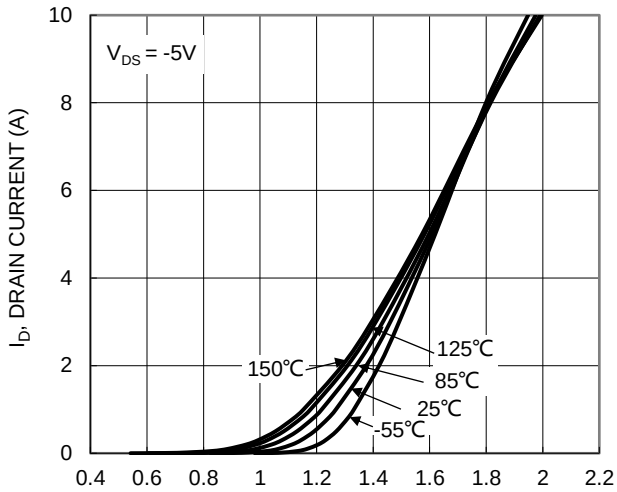


Figure 2. Typical Transfer Characteristic

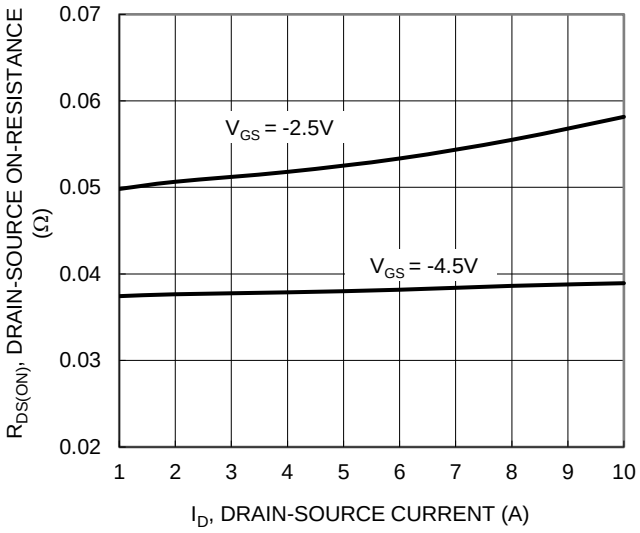


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

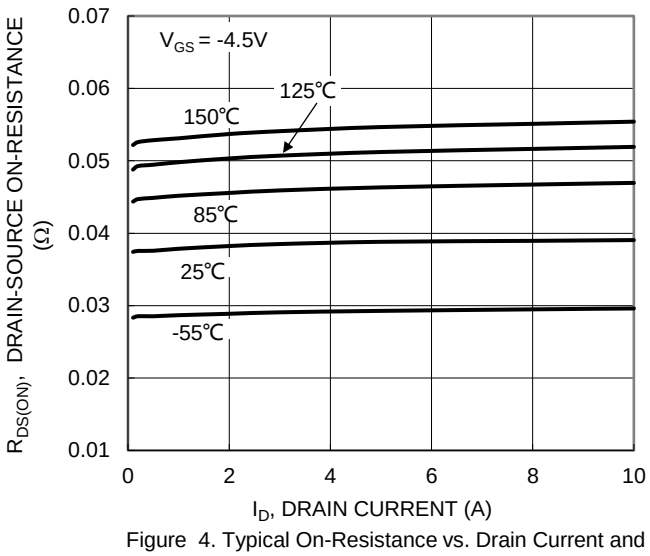


Figure 4. Typical On-Resistance vs. Drain Current and Junction Temperature

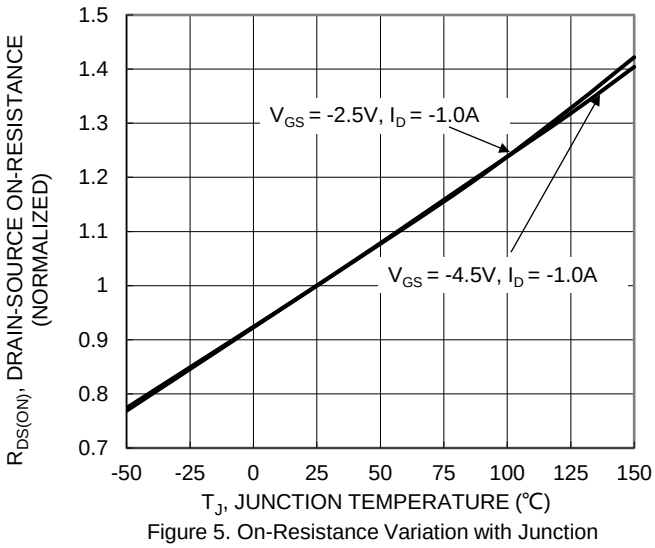


Figure 5. On-Resistance Variation with Junction Temperature

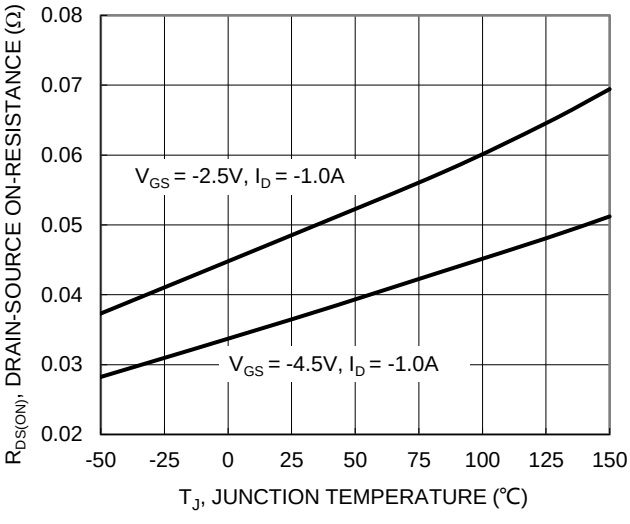


Figure 6. On-Resistance Variation with Junction Temperature

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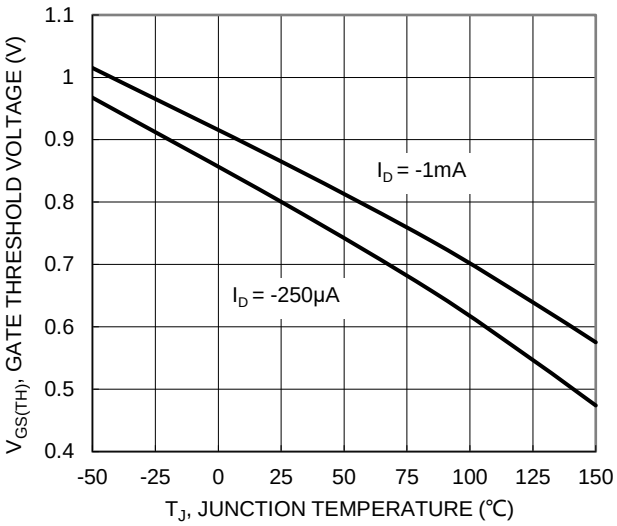


Figure 7. Gate Threshold Variation vs. Junction Temperature

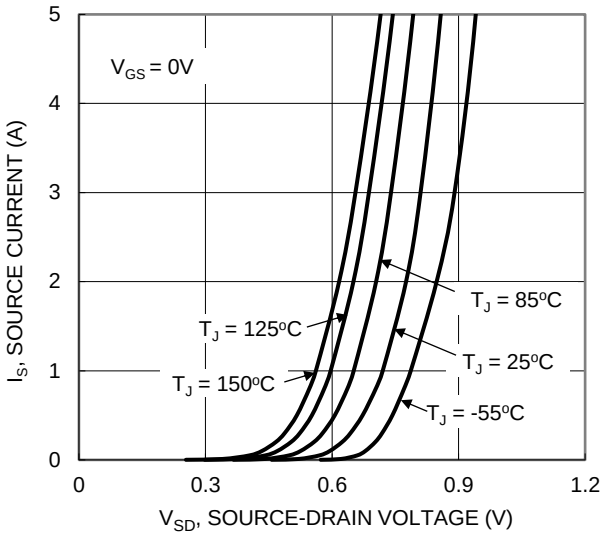


Figure 8. Diode Forward Voltage vs. Current

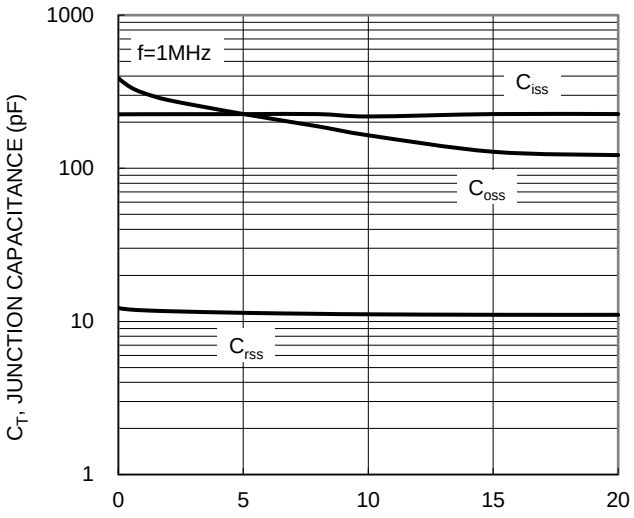


Figure 9. Typical Junction Capacitance

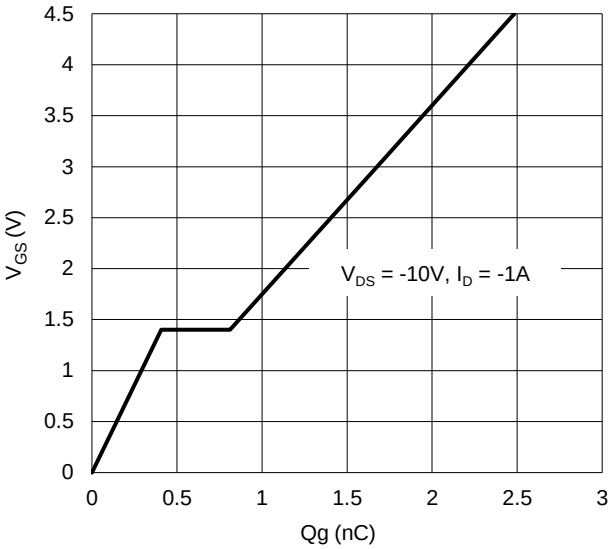


Figure 10. Gate Charge

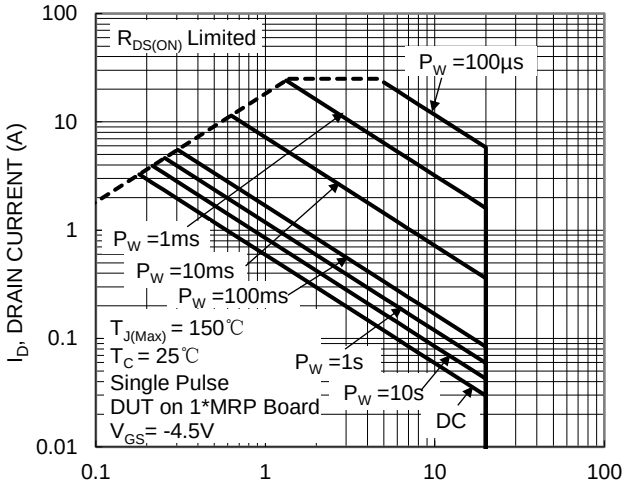


Figure 11. SOA, Safe Operation Area

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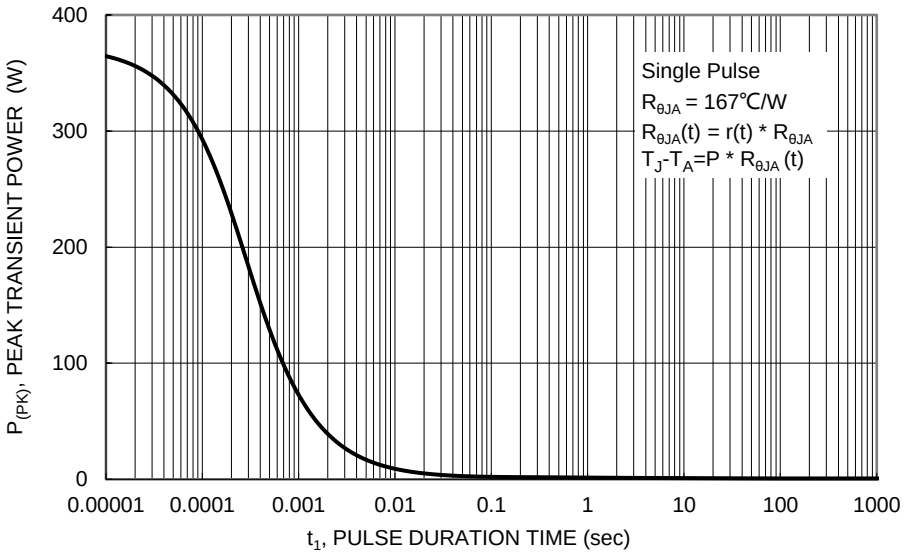


Figure 12. Single Pulse Maximum Power Dissipation

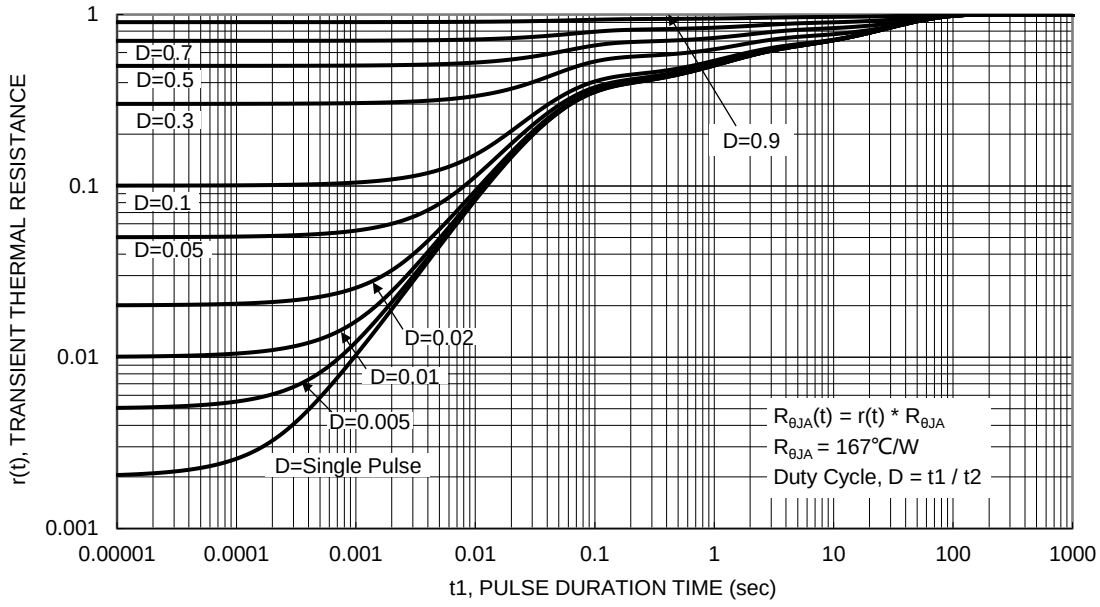


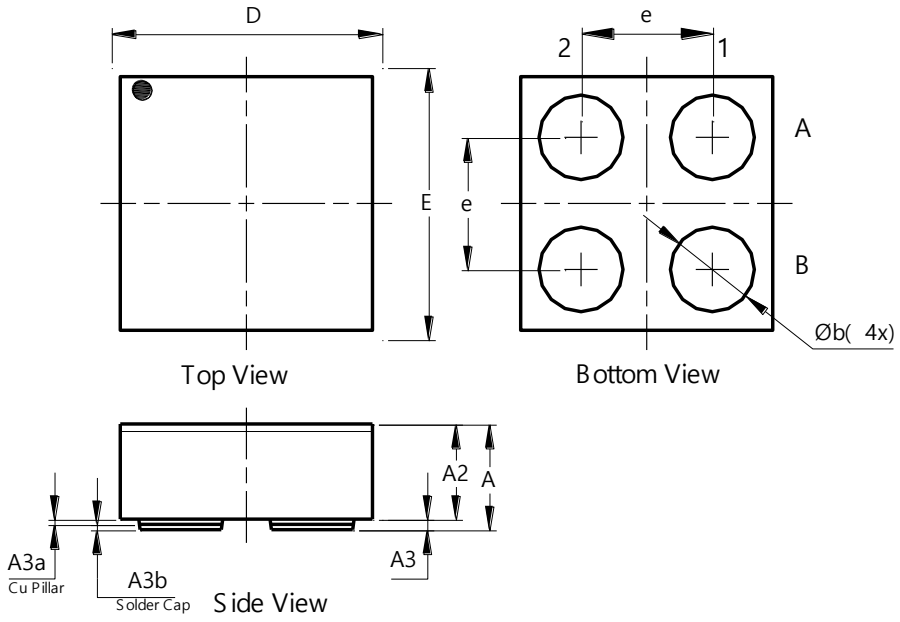
Figure 13. Transient Thermal Resistance

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Package Outline Dimensions

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X1-DSN1010-4 (Type C)

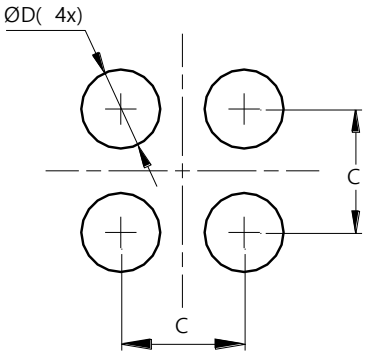


X1-DSN1010-4 (Type C)			
Dim	**Min**	**Max**	**Typ**
A	--	0.45	0.40
A2	--	--	0.36
A3	0.034	0.046	0.040
A3a	0.015	0.025	0.020
A3b	0.017	0.023	0.020
b	0.27	0.37	0.32
D	0.92	1.00	0.96
E	0.92	1.00	0.96
e	--	--	0.50
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

X1-DSN1010-4 (Type C)



Dimensions	Value (in mm)
C	0.50
D	0.25

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