

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Typ.	I <sub>D</sub> T <sub>A</sub> = +25°C
-20V	37mΩ @ V <sub>GS</sub> = -4.5V	-3.4A
	49mΩ @ V <sub>GS</sub> = -2.5V	-2.9A

## Description and Applications

This new generation MOSFET has been designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Battery managements
- Load switches
- Battery protections

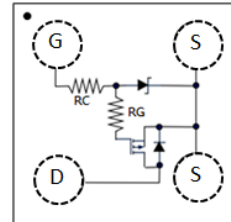
## Features and Benefits

- Low Q<sub>g</sub> & Q<sub>gd</sub>
- 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](mailto:contact@diodes.com) 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)



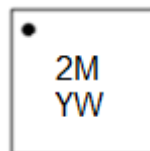
Top View  
Equivalent Circuit

## Ordering Information (Note 4)

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

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  - 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.
  - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - 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  $\bar{Y}$  = Year (ex: 2 = 2022)  
 W or  $\bar{W}$  = 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			

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	-20	V
Gate-Source Voltage	V <sub>GSS</sub>	-6	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = -4.5V	I <sub>D</sub>	-3.4	A
Continuous Drain Current (Note 6) V <sub>GS</sub> = -2.5V	I <sub>D</sub>	-2.9	A
Pulsed Drain Current (Note 5)	I <sub>DM</sub>	-16	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P <sub>D</sub>	0.86	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 6)	R <sub>θJA</sub>	145.7	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	-1	μA	V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	-100	nA	V <sub>GS</sub> = -6V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-0.4	-0.8	-1.2	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	37	48	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -1A
		—	49	65		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -1A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.7	-1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	218	—	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	148	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	11	—		
Series Gate Resistance	R <sub>g</sub>	—	20	—	Ω	f = 1MHz, V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V
Series Clamp Resistance	R <sub>c</sub>	—	5000	—		
Total Gate Charge	Q <sub>g</sub>	—	2.5	—	nC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -1A
Gate-Source Charge	Q <sub>gs</sub>	—	0.4	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	0.4	—		
Gate Charge at V <sub>TH</sub>	Q <sub>g(TH)</sub>	—	0.2	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	0.6	—	μs	V <sub>DS</sub> = -10V, V <sub>GS</sub> = -2.5V, R <sub>g</sub> = 10Ω, I <sub>D</sub> = -1A
Turn-On Rise Time	t <sub>r</sub>	—	0.8	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	1.4	—		
Turn-Off Fall Time	t <sub>f</sub>	—	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.

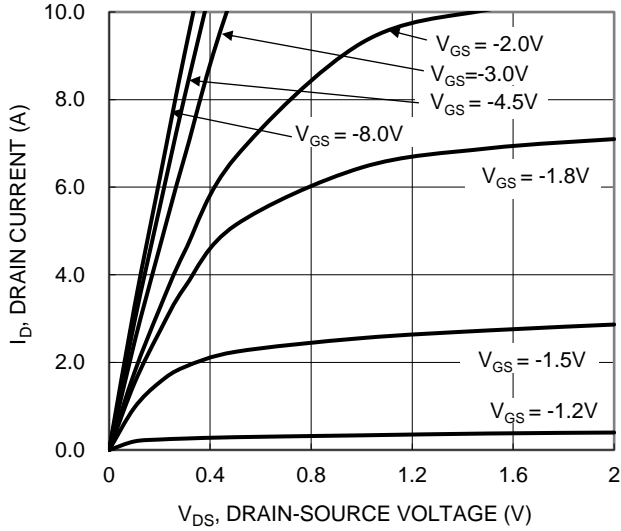


Figure 1. Typical Output Characteristic

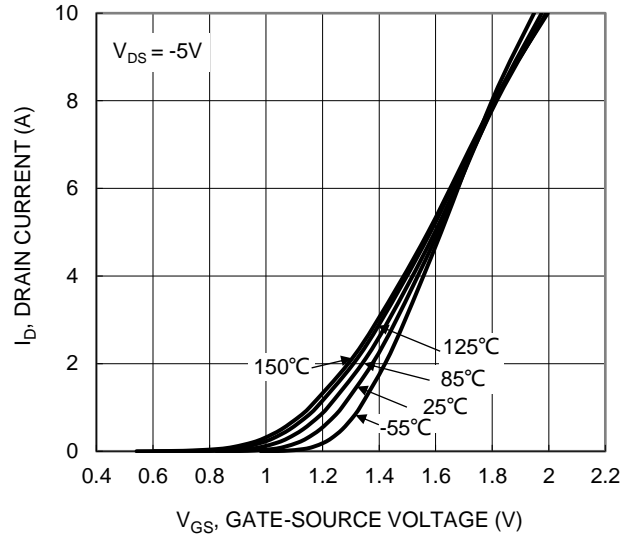


Figure 2. Typical Transfer Characteristic

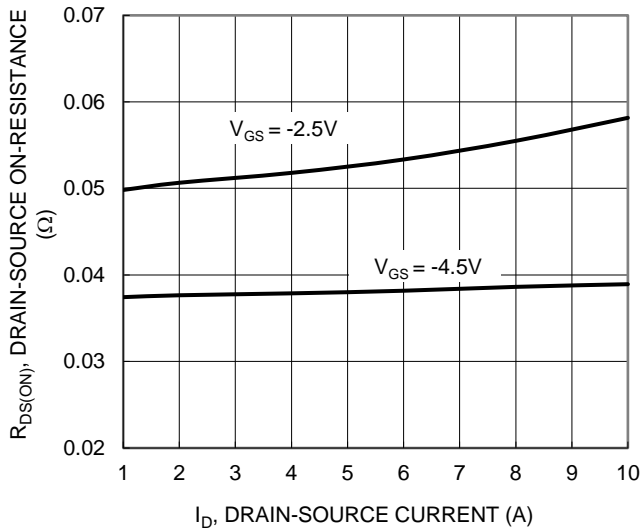


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

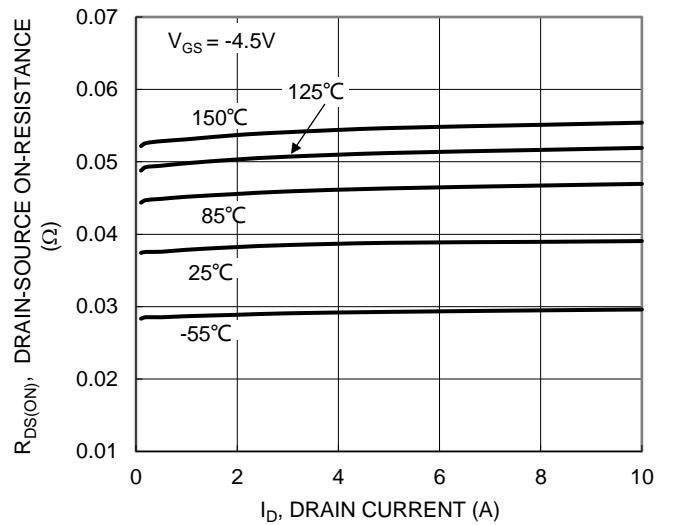


Figure 4. Typical On-Resistance vs. Drain Current and Junction Temperature

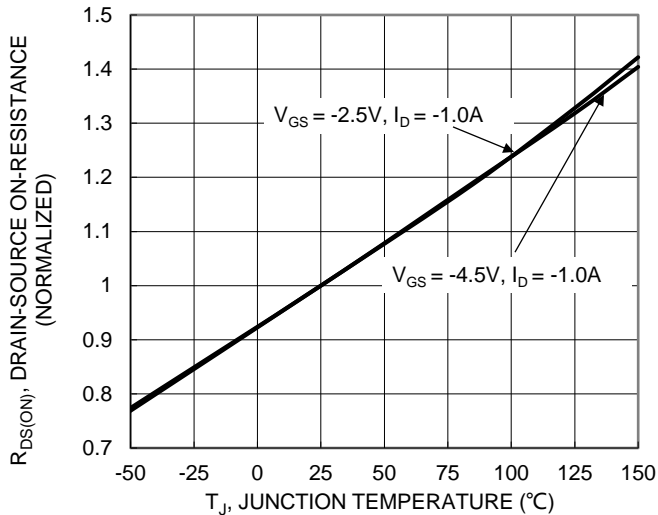


Figure 5. On-Resistance Variation with Junction Temperature

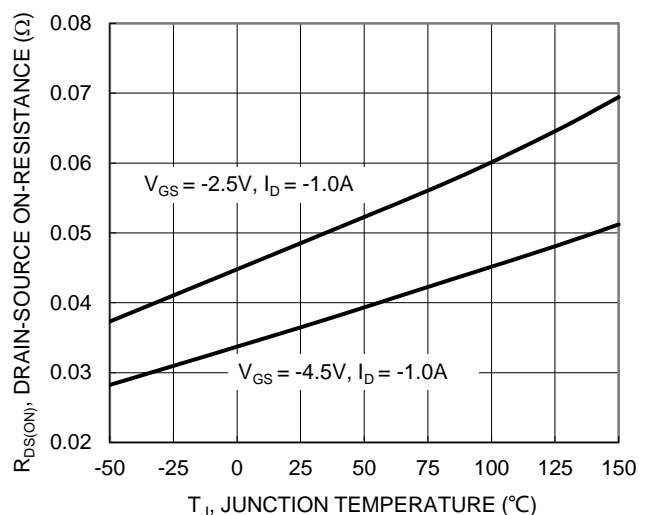


Figure 6. On-Resistance Variation with Junction Temperature

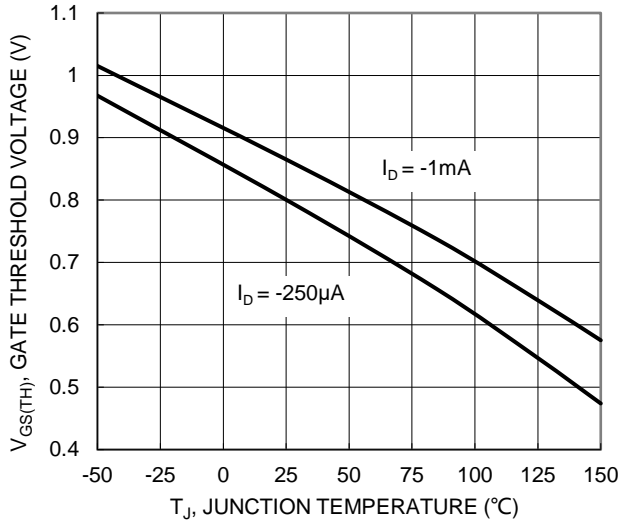


Figure 7. Gate Threshold Variation vs. Junction Temperature

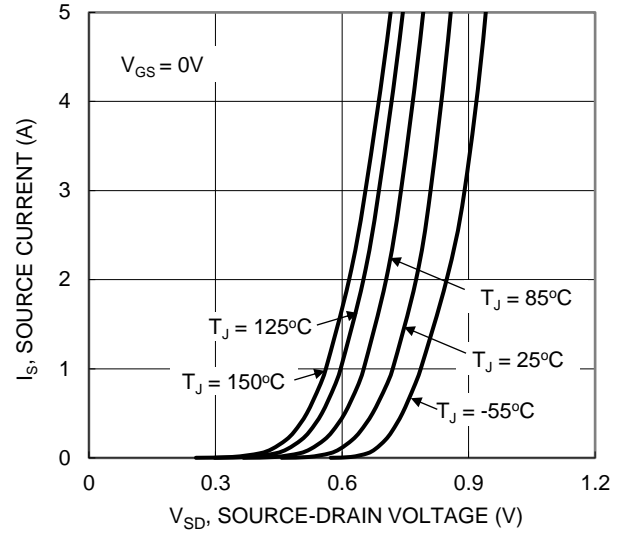


Figure 8. Diode Forward Voltage vs. Current

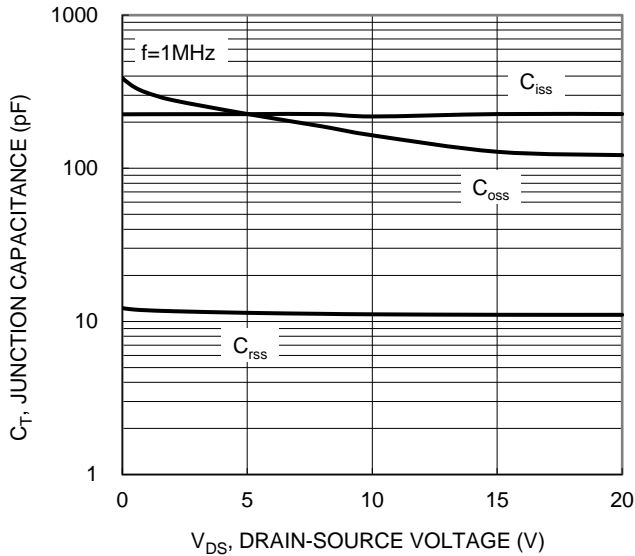


Figure 9. Typical Junction Capacitance

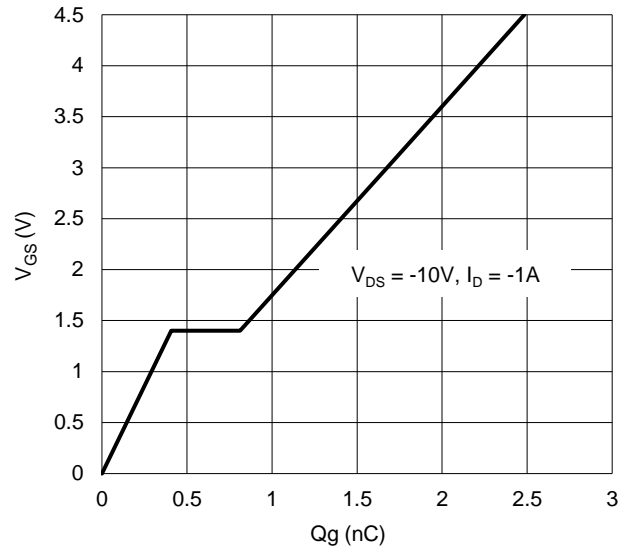


Figure 10. Gate Charge

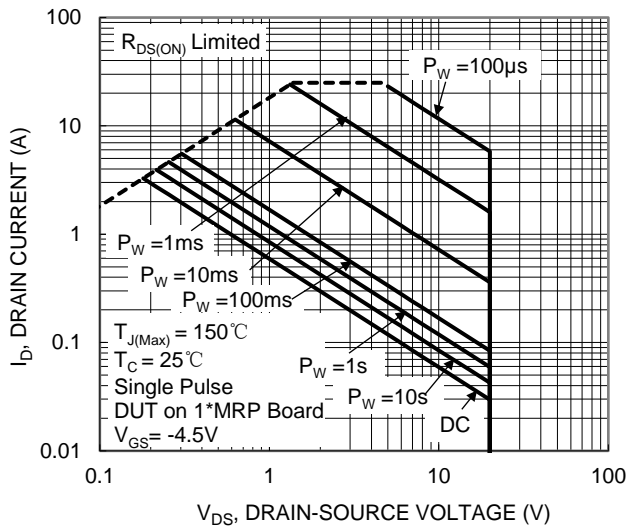


Figure 11. SOA, Safe Operation Area

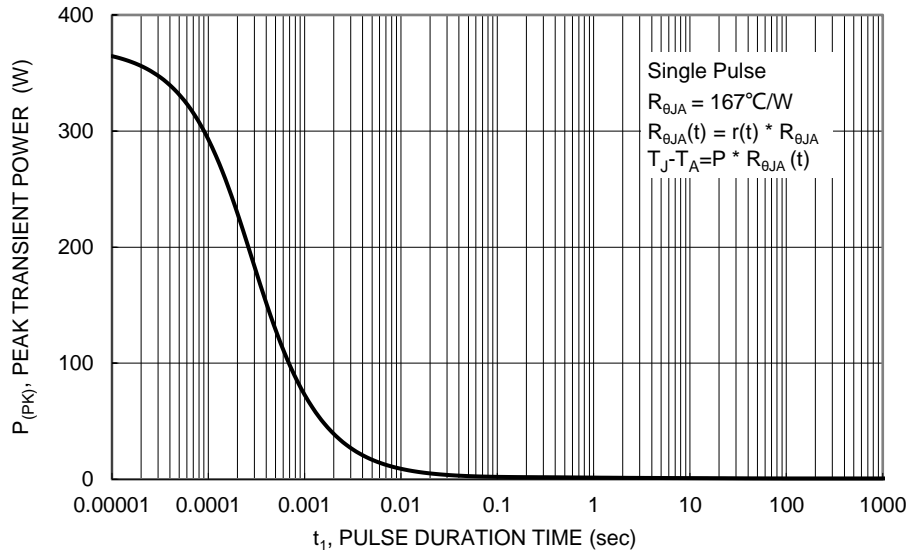


Figure 12. Single Pulse Maximum Power Dissipation

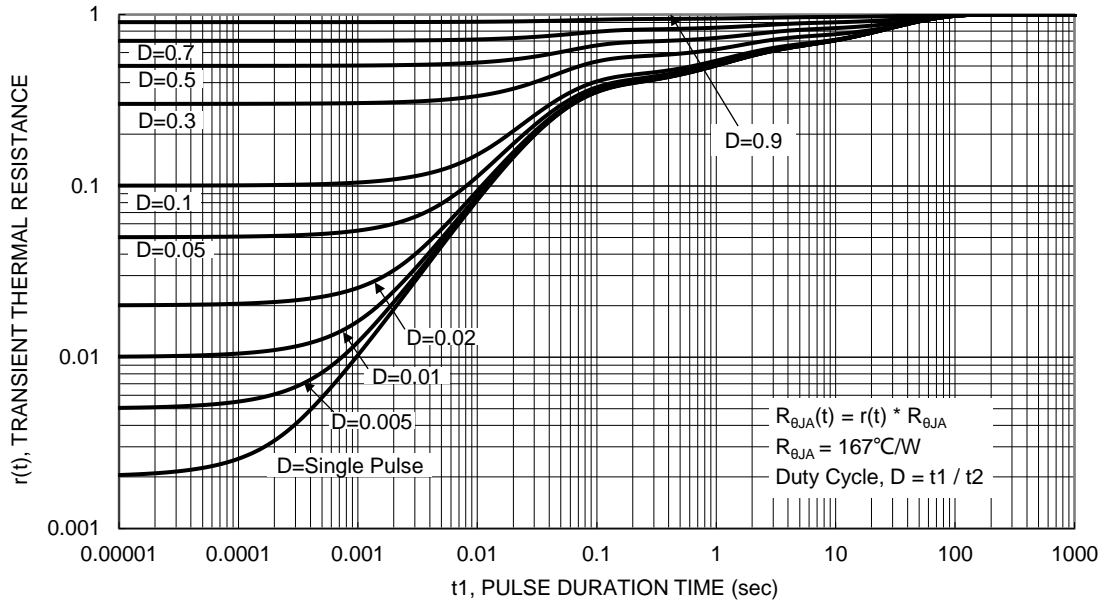
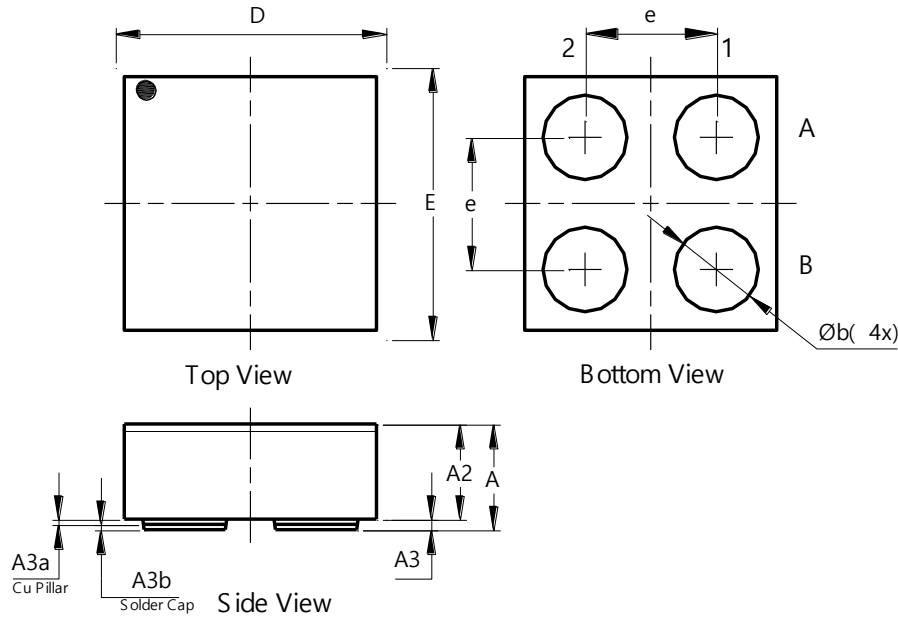


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**X1-DSN1010-4 (Type C)**

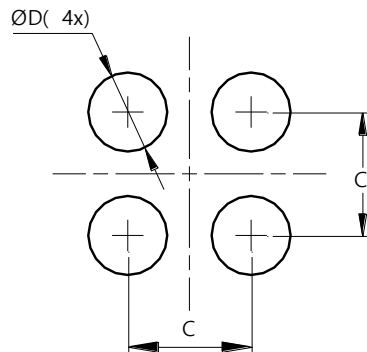


X1-DSN1010-4 (Type C)			
Dim	Min	Max	Typ
A	--	0.45	0.40
A2	--	--	0.36
A3	0.034	0.046	0.040
A3a	0.015	0.025	0.020
A3b	0.017	0.023	0.020
b	0.27	0.37	0.32
D	0.92	1.00	0.96
E	0.92	1.00	0.96
e	--	--	0.50
<b>All Dimensions in mm</b>			

**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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