Product Summary (typ. @ V_{GS} = 4.5V, T_A = +25°C)

BV_{SSS}	$R_{SS(ON)}$	Q_g	Q_{gd}	I_S
20V	20mΩ	28.5nC	0.6nC	8.3A

Description

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

Applications

- Battery managements
- Load switches
- Battery protections

Features

- Common Drain Configuration with:
  $R_{SS(ON)}$ = 20mΩ to Minimize On-State Losses
  Q_g = 28.5nC for Ultra-Fast Switching
  $V_{GS(TH)}$ = 0.9V typ. for a Low Turn-On Potential
- CSP with Footprint 1.35mm × 1.35mm
- Height = 0.22mm for Low Profile
- ESD Protection of Gate
- **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/

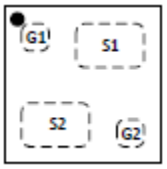
Mechanical Data

- Package: X4-DSN1313-4
- Terminal Connections: See Diagram Below
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — NiPdAu or NiAu. Solderable per MIL-STD-202, Method 208e4
- Weight: 0.0026 grams (Approximate)

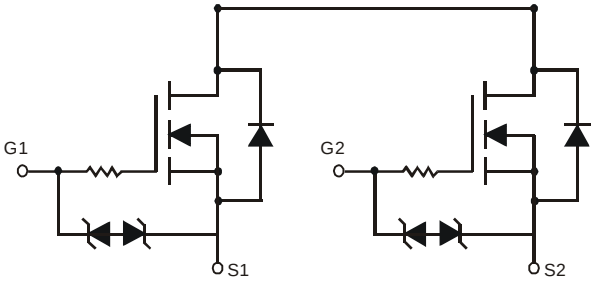


ESD PROTECTED

X4-DSN1313-4



Top View



Equivalent Circuit

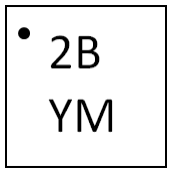
Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMN2024LCA4-7	X4-DSN1313-4	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

X4-DSN1313-4



2B = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: K = 2023)
M = Month (ex: 9 = September)

Date Code Key

Year	2020	…	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Code	H	…	K	L	M	N	P	R	S	T	U	V

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

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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}	±10	V
Continuous Source Current (Note 5) V_{GS} = 4.5V	Steady State	T_A = +25°C T_A = +70°C	I_S	8.3 6.7	A
Continuous Source Current (Note 5) V_{GS} = 2.5V	Steady State	T_A = +25°C T_A = +70°C	I_S	6.9 5.5	A
Pulsed Source Current (Note 6)			I_{SM}	50	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 7)	P_D	1.1	W
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 7)	$R_{\theta JA}$	111	°C/W
Power Dissipation (Note 5)	P_D	2.4	W
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 5)	$R_{\theta JA}$	52	°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 8)						
Drain-Source Breakdown Voltage	BV_{SSS}	20	—	—	V	V_{GS} = 0V, I_S = 250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{SSS}	—	—	1	µA	V_{SS} = 16V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	0.5	µA	V_{GS} = 6V, V_{DD} = 0V
		—	—	4		V_{GS} = 10V, V_{DD} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.68	0.9	1.3	V	V_{SS} = V_{GS}, I_S = 250µA
Static Source-Source On-Resistance	$R_{SS(ON)}$	—	—	21	mΩ	V_{GS} = 6.5V, I_S = 2A
		—	—	23		V_{GS} = 4.5V, I_S = 2A
		—	—	34		V_{GS} = 2.5V, I_S = 2A
Diode Forward Voltage	V_{SS}	—	0.6	1	V	V_{GS} = 0V, I_S = 2A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	991	—	pF	V_{SS} = 10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	137	—		
Reverse Transfer Capacitance	C_{rss}	—	81	—		
Total Gate Charge	Q_g	—	28.5	—	nC	V_{GS} = 10V, V_{SS} = 10V, I_S = 2A
Gate-Source Charge	Q_{gs}	—	7.4	—		
Gate-Drain Charge	Q_{gd}	—	0.6	—		
Gate Charge at V_{TH}	$Q_{G(TH)}$	—	4.7	—		
Turn-On Delay Time	$t_{D(ON)}$	—	8.7	—	ns	V_{SS} = 10V, V_{GS} = 4.5V, R_G = 0Ω, I_S = 2A
Turn-On Rise Time	t_R	—	2.5	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	17.6	—		
Turn-Off Fall Time	t_F	—	8.4	—		

Notes:
5. Device mounted on FR4 material with 1-inch^2 (6.45-cm^2), 2-oz. (0.071-mm thick) Cu.
6. Repetitive rating, pulse width limited by junction temperature.
7. Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to production testing.

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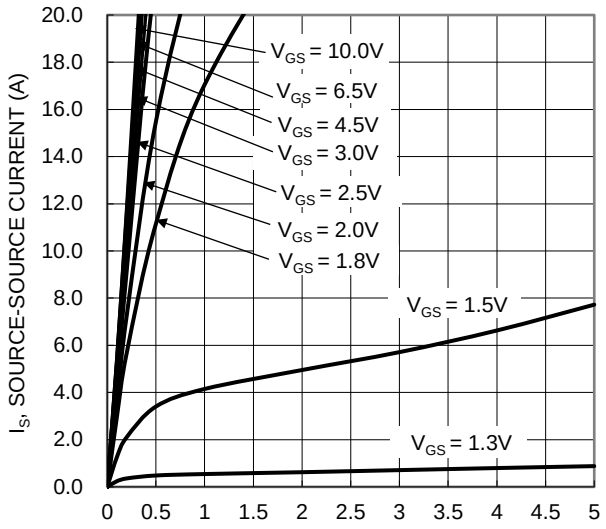


Figure 1. Typical Output Characteristic

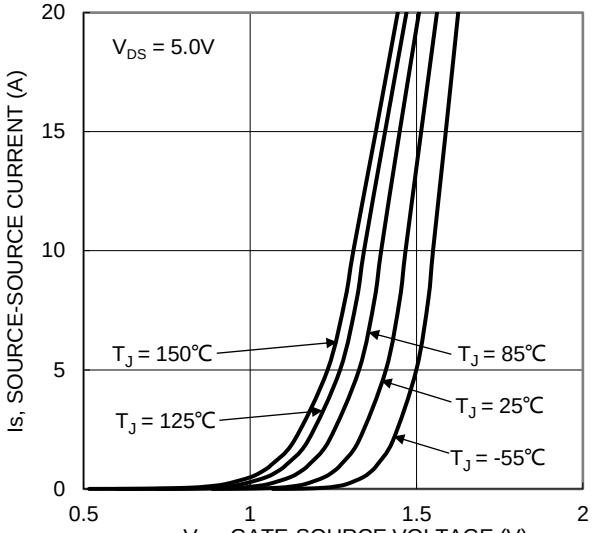


Fig.2 Typical Transfer Characteristic

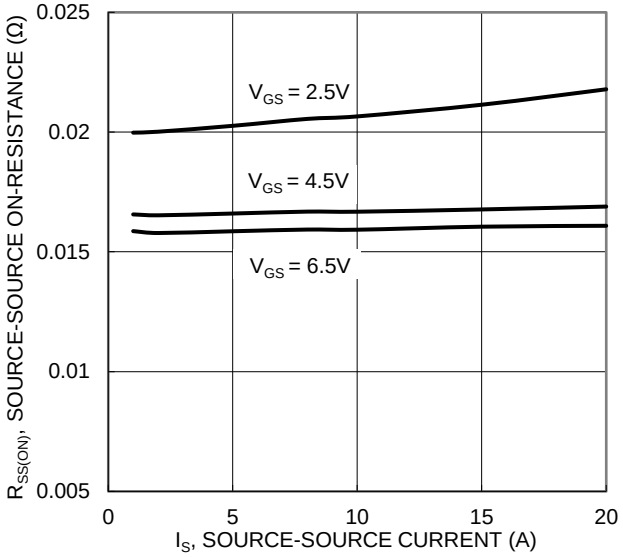


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

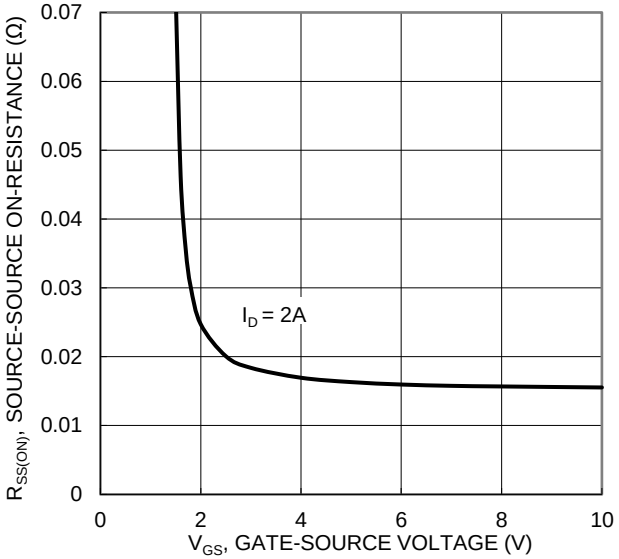


Figure 4. Typical Transfer Characteristic

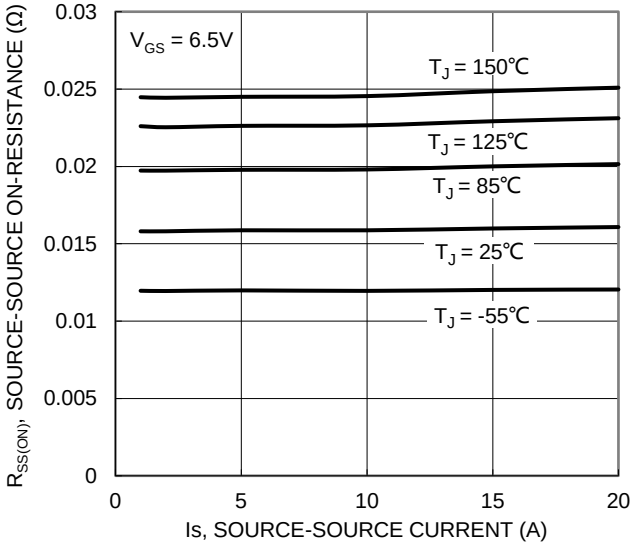


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

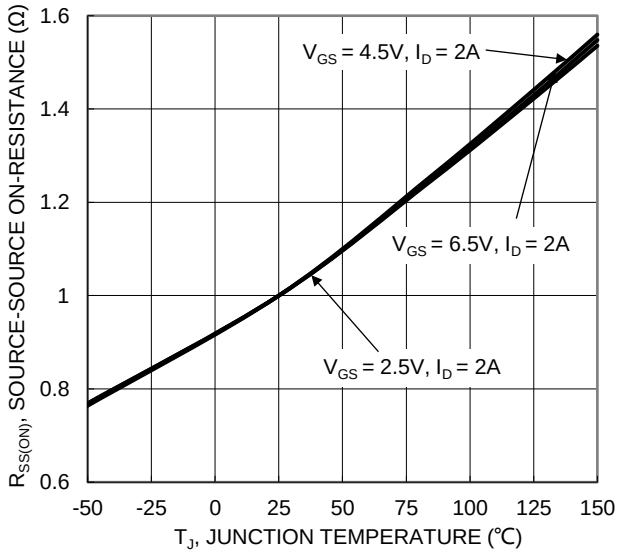


Figure 6. On-Resistance Variation with Temperature

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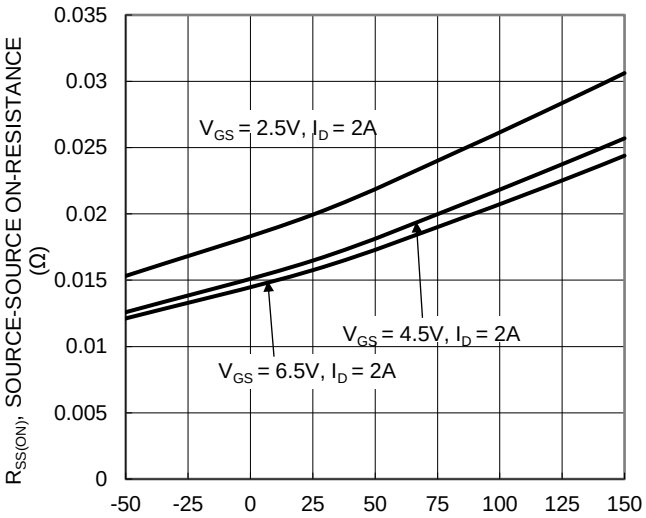


Figure 7. On-Resistance Variation with Temperature

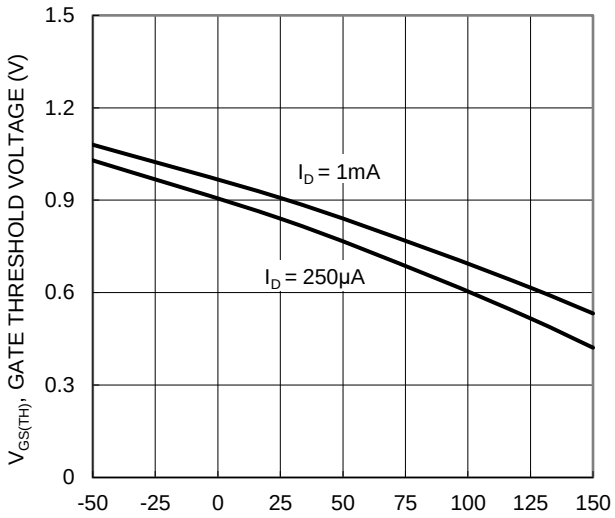


Figure 8. Gate Threshold Variation vs. Junction Temperature

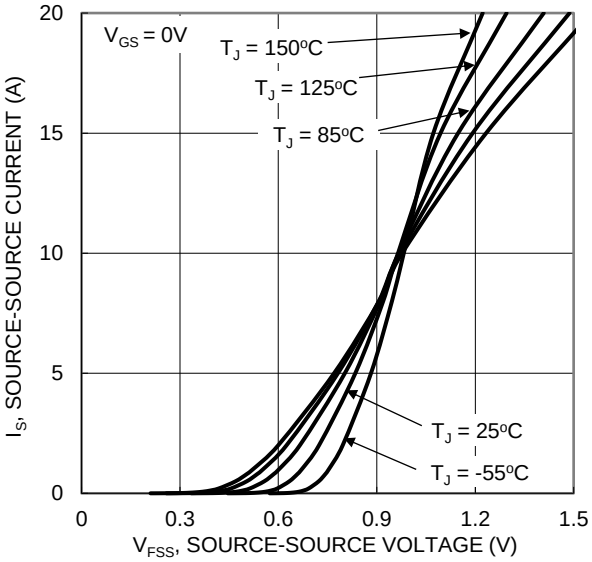


Figure 9. Diode Forward Voltage vs. Current

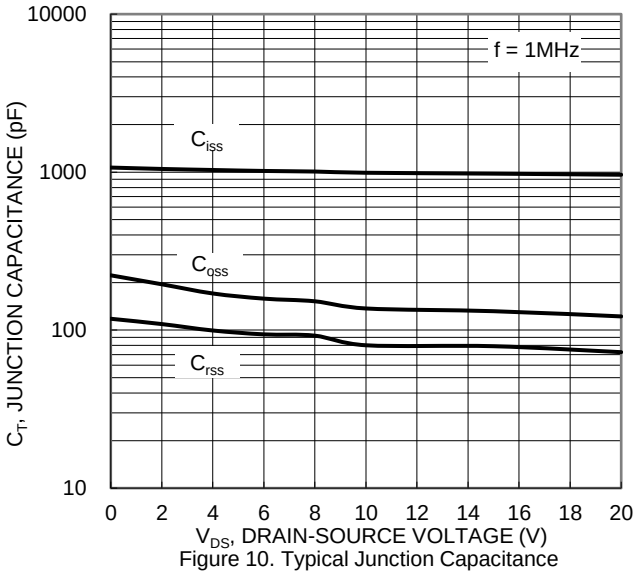


Figure 10. Typical Junction Capacitance

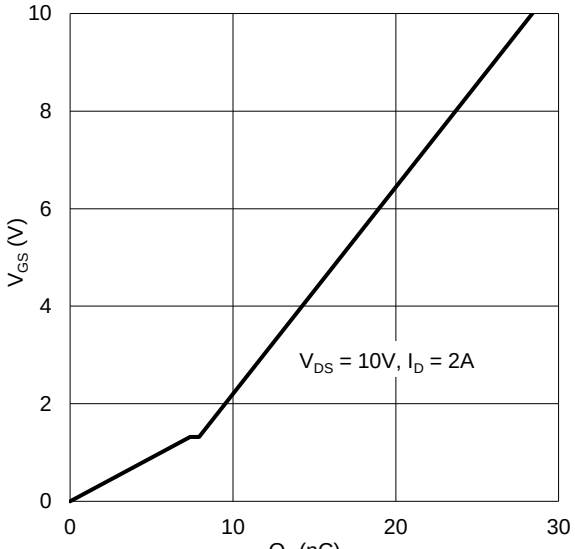


Figure 11. Gate Charge

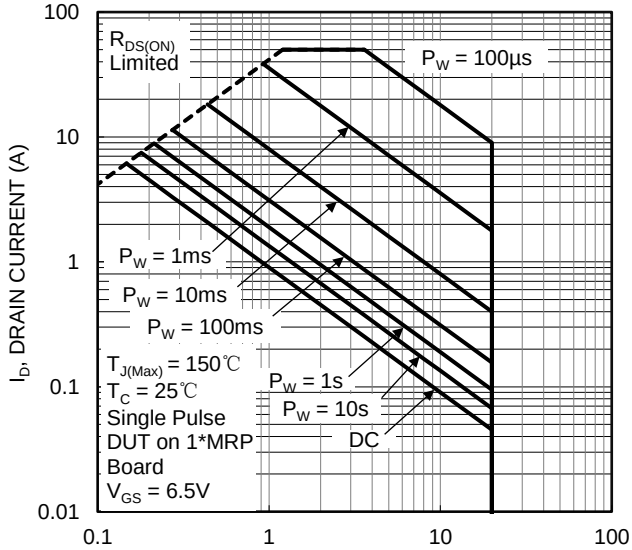


Figure 12. SOA, Safe Operation Area

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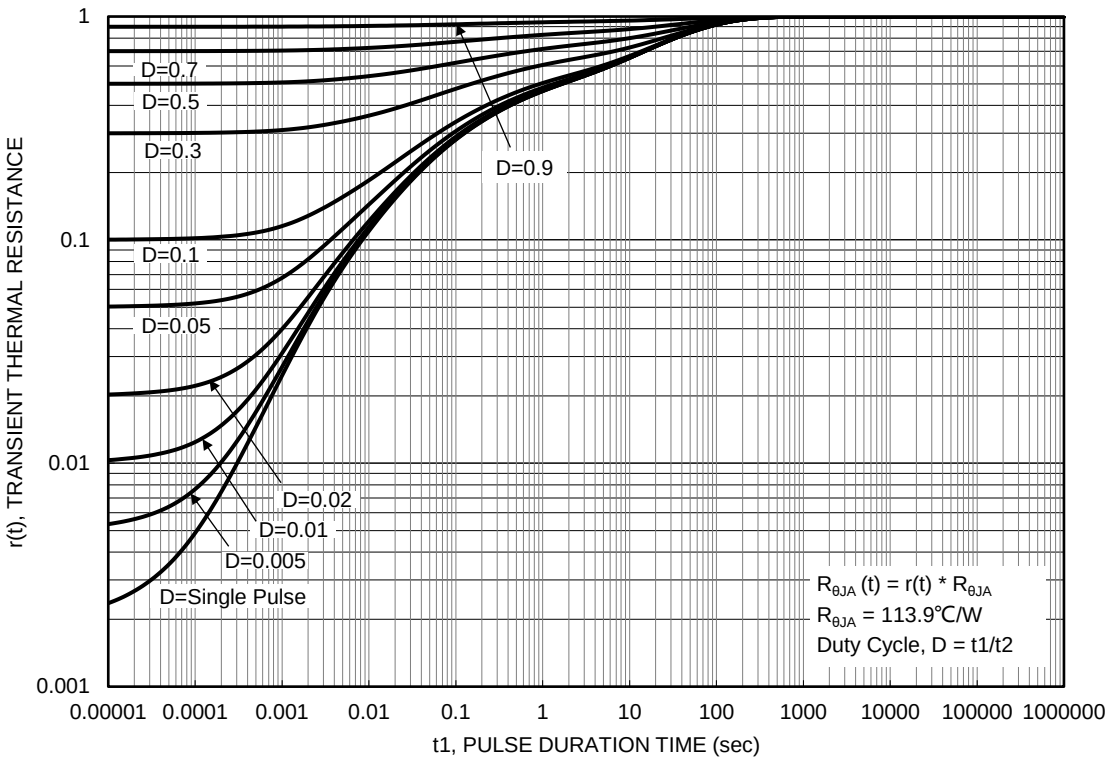


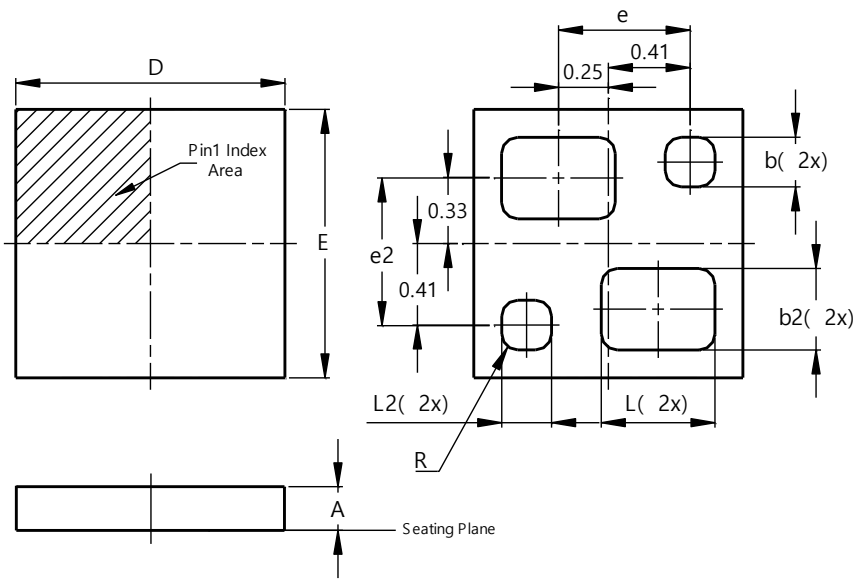
Figure 13. Transient Thermal Resistance

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Package Outline Dimensions

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

X4-DSN1313-4

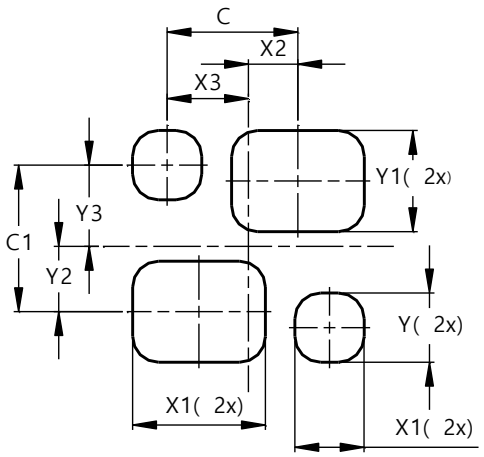


X4-DSN1313-4			
Dim	**Min**	**Max**	**Typ**
A	0.15	0.25	0.20
b	0.24	0.26	0.25
b2	0.40	0.42	0.41
D	1.30	1.40	1.35
E	1.30	1.40	1.35
e	--	--	0.66
e2	--	--	0.74
L	0.56	0.58	0.57
L2	0.24	0.26	0.25
r	--	--	0.08
All Dimensions in mm			

Suggested Pad Layout

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

X4-DSN1313-4



Dimensions	Value (in mm)
C	0.66
C1	0.74
X	0.67
X1	0.35
X2	0.25
X3	0.41
Y	0.35
Y1	0.51
Y2	0.33
Y3	0.41

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