Product Summary

V_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
-8V	5.7mΩ@V_{GS} = -4.5V	-16A

Description

This 3rd generation Lateral MOSFET (LD-MOS) is engineered to minimize on-state losses and switch ultra-fast, making it ideal for high efficiency power transfer. It uses Chip-Scale Package (CSP) to increase power density by combining low thermal impedance with minimal $R_{DS(ON)}$ per footprint area.

Applications

- DC-DC Converters
- Battery Management
- Load Switch

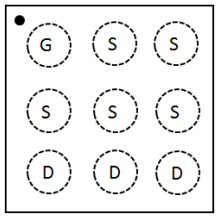
Features

- LD-MOS Technology with the Lowest Figure of Merit:
  - $R_{DS(ON)}$ = 5.7mΩ to Minimize On-State Losses
  - Q_g = 9.5nC for Ultra-Fast Switching
- $V_{GS(TH)}$ = -0.7V Typ. for a Low Turn-On Potential
- CSP with Footprint 1.5mm x 1.5mm
- Height = 0.34mm for Low Profile
- ESD Protection of Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

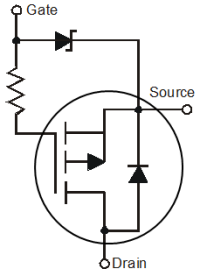
Mechanical Data

- Case: X2-DSN1515-9
- Terminal Connections: See Diagram Below
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Material: Finish – CuNiAu. Solderable per MIL-STD-202, Method 208 e4

X2-DSN1515-9



Top-View
Pin Configuration



Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP1008UCA9-7	X2-DSN1515-9	3,000/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

X2-DSN1515-9

MK = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: G = 2019)
M or $\overline{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027
Code	G	H	I	J	K	L	M	N	O

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

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-8	V
Gate-Source Voltage			V_{GSS}	-6	V
Continuous Drain Current (Note 5) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-11.5 -9.5	A
Continuous Drain Current (Note 6) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-16 -13	A
Pulsed Drain Current (Pulse Duration 10µs, Duty Cycle ≤1%)			I_{DM}	-80	A
Continuous Source Pin Current (Note 6)			I_S	-2.8	A
Pulsed Source Pin Current (Pulse Duration 10µs, Duty Cycle ≤1%)			I_{SM}	-80	A
Continuous Gate Current			I_G	-0.28	A

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P_D	1.2	W
Total Power Dissipation (Note 6)	P_D	2.2	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	105	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	55	°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}	-8	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current @T_C = +25°C	I_{DSS}	—	—	-1	µA	V_{DS} = -6.4V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	-100	nA	V_{GS} = -6.0V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.4	—	-1.1	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	5.2	5.7	mΩ	V_{GS} = -4.5V, I_D = -2A
			6.5	8.2		V_{GS} = -3.0V, I_D = -2A
			7.4	9.1		V_{GS} = -2.5V, I_D = -2A
Diode Forward Voltage (Note 6)	V_{SD}	—	—	-1	V	V_{GS} = 0V, I_S = -2A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	952	—	pF	V_{DS} = -4V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	534	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	164	—	pF	
Series Gate Resistance	R_G	—	21.3	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge	Q_g	—	9.5	—	nC	V_{GS} = -4.5V, V_{DS} = -4.5V, I_D = -2A
Gate-Source Charge	Q_{gs}	—	1.1	—	nC	
Gate-Drain Charge	Q_{gd}	—	1.4	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	33.2	—	ns	V_{DD} = -4V, V_{GS} = -4.5V, I_{DS} = -2A, R_G = 10Ω
Turn-On Rise Time	t_R	—	102.4	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	230.2	—	ns	
Turn-Off Fall Time	t_F	—	87.3	—	ns	
Reverse Recovery Charge	Q_{RR}	—	9.0	—	nC	V_{DD} = -5V, I_F = -2A, di/dt = 200A/µs
Reverse Recovery Time	t_{RR}	—	25.5	—	ns	

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

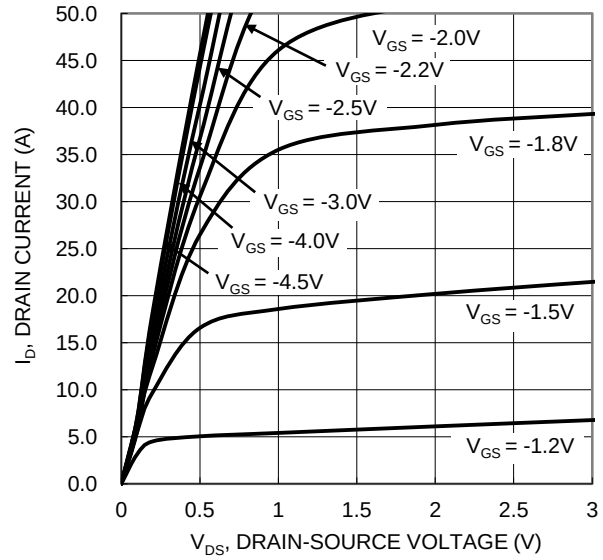


Figure 1. Typical Output Characteristic

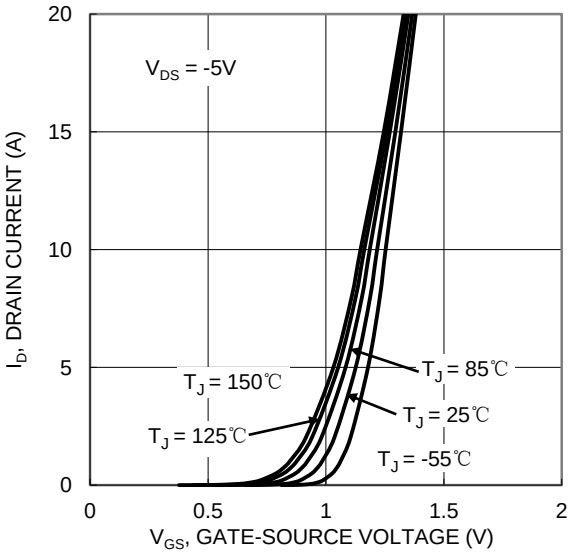


Figure 2. Typical Transfer Characteristic

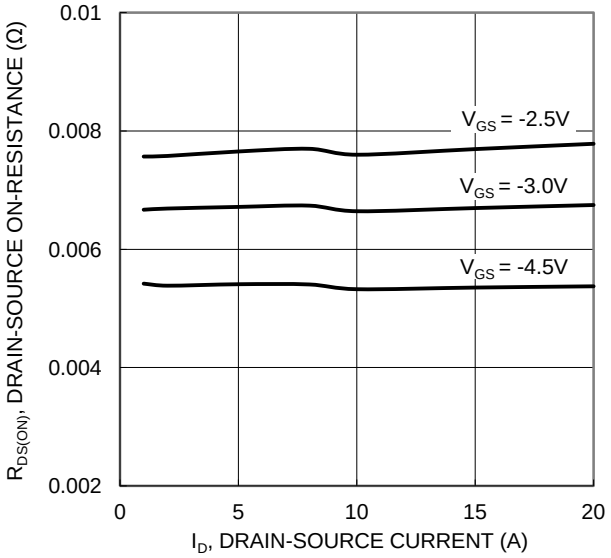


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

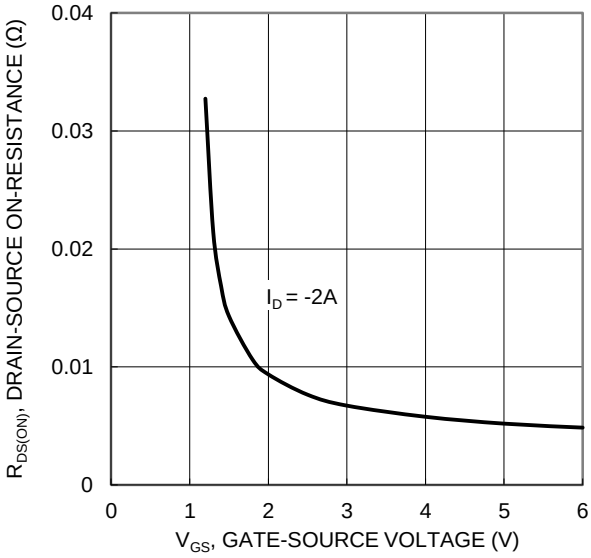


Figure 4. Typical Transfer Characteristic

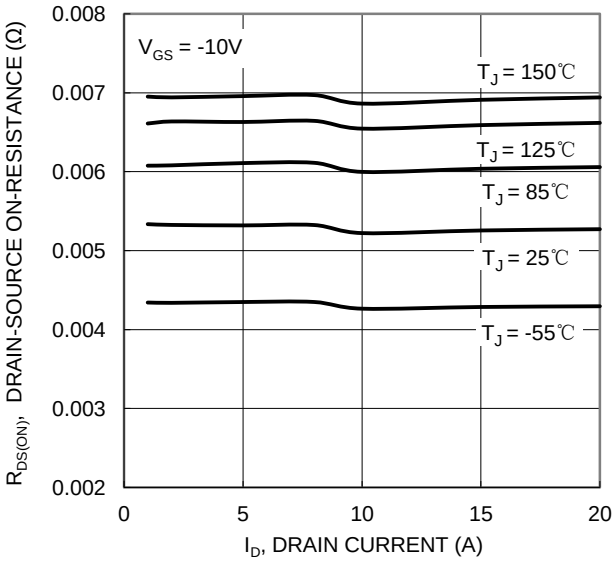


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

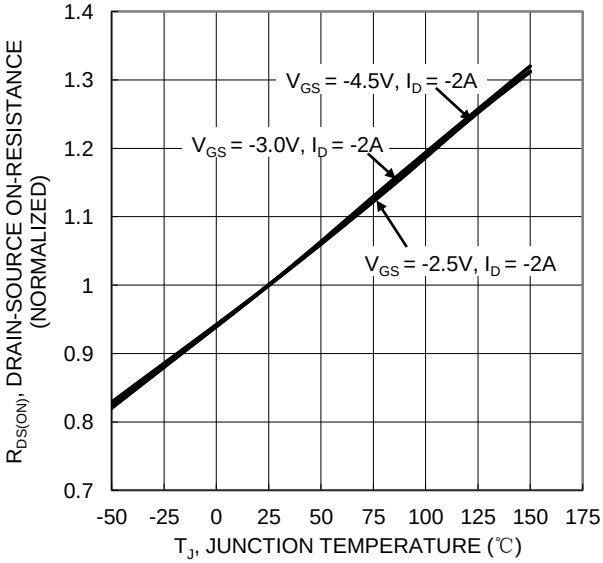


Figure 6. On-Resistance Variation with Junction Temperature

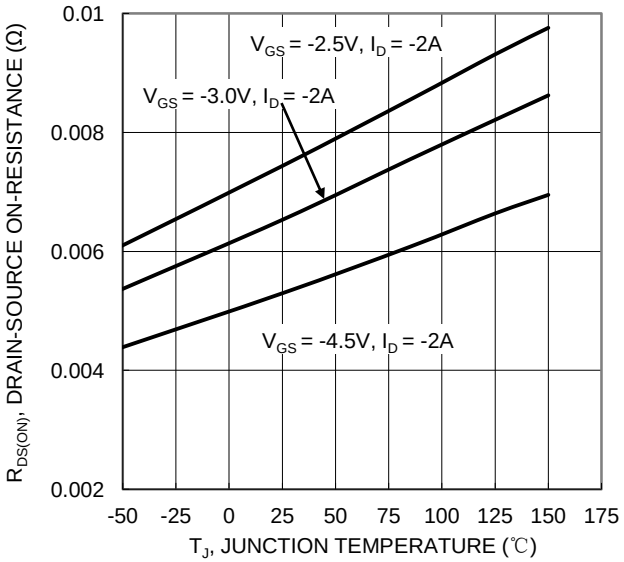


Figure 7. On-Resistance Variation with Junction Temperature

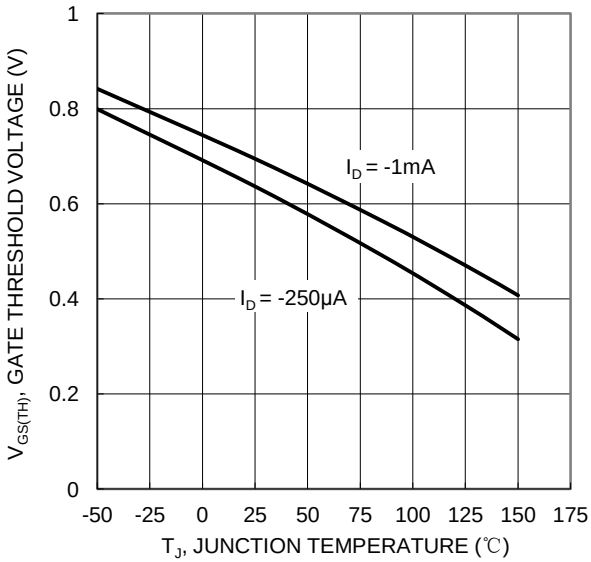


Figure 8. Gate Threshold Variation vs. Junction Temperature

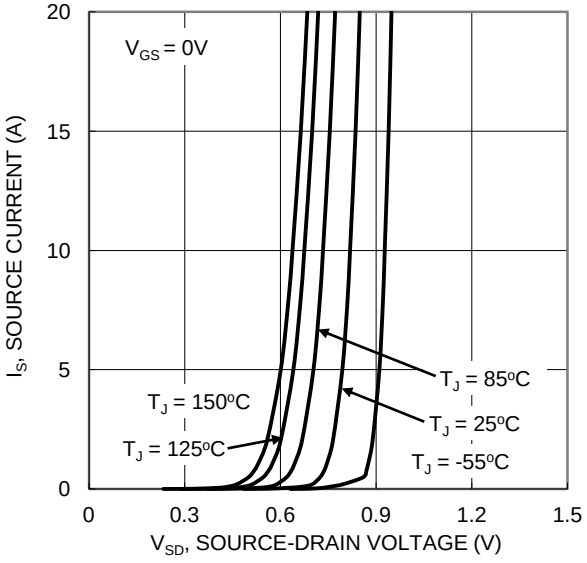


Figure 9. Diode Forward Voltage vs. Current

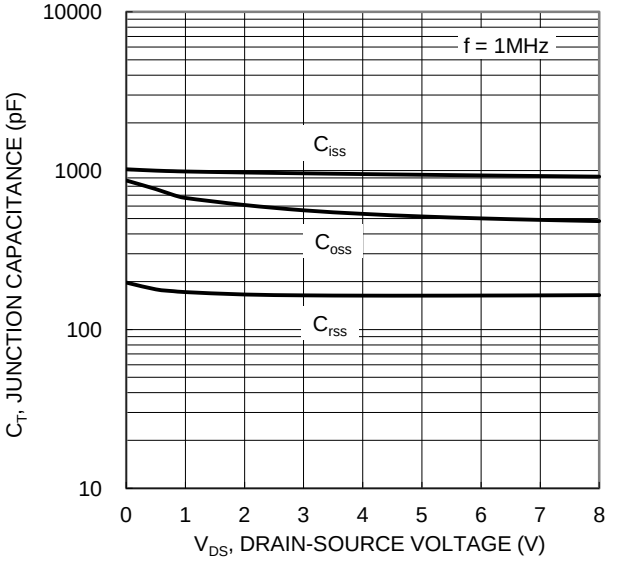


Figure 10. Typical Junction Capacitance

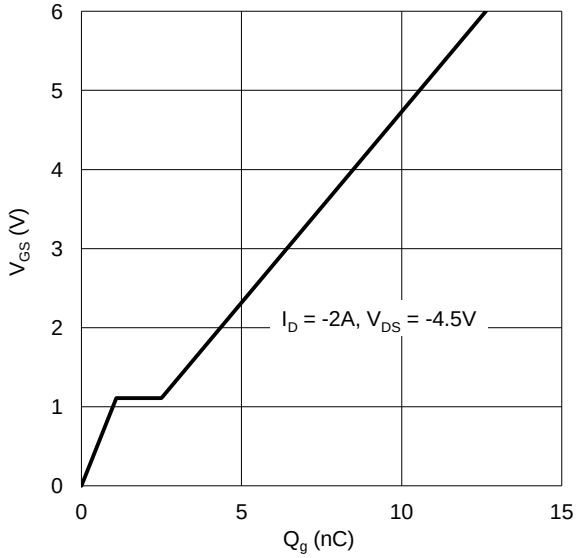


Figure 11. Gate Charge

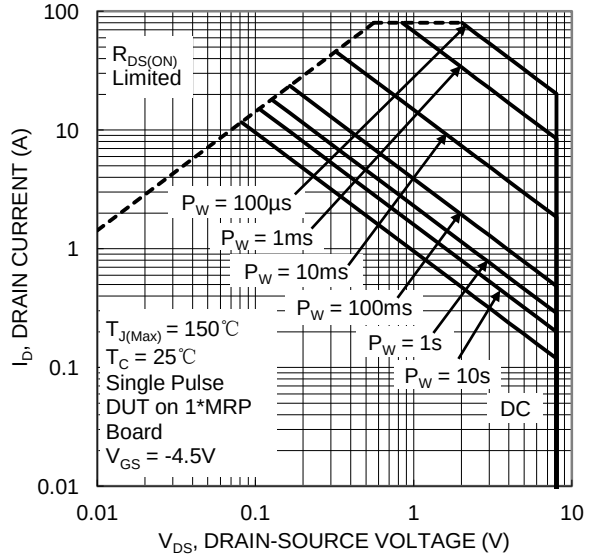


Figure 12. SOA, Safe Operation Area

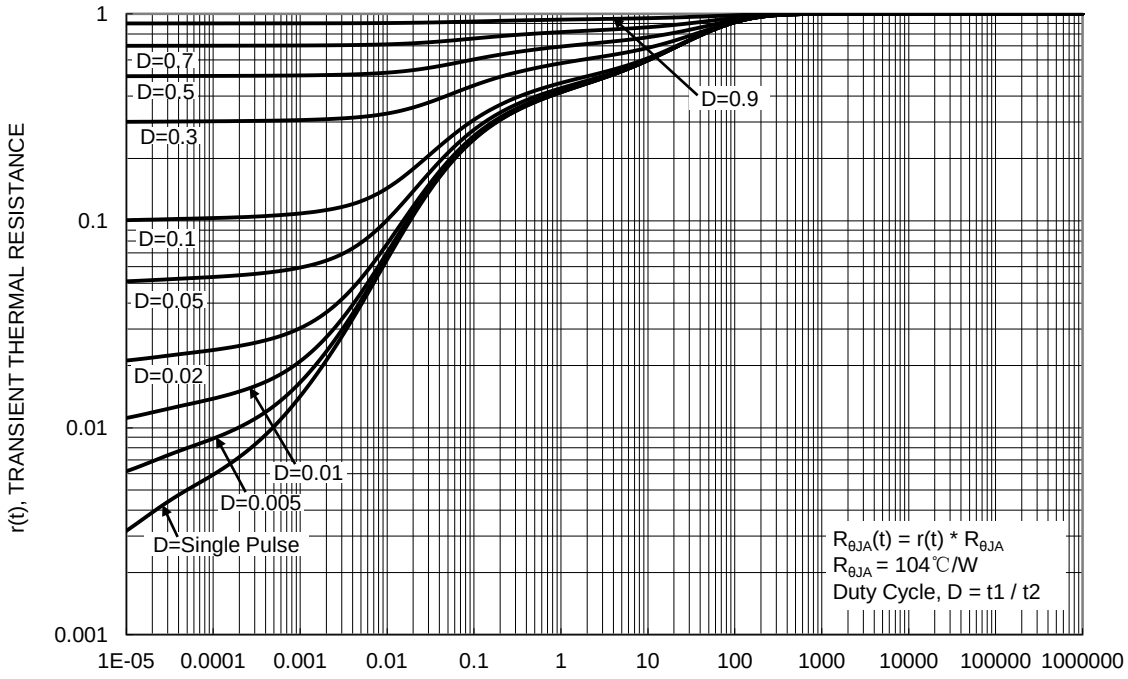
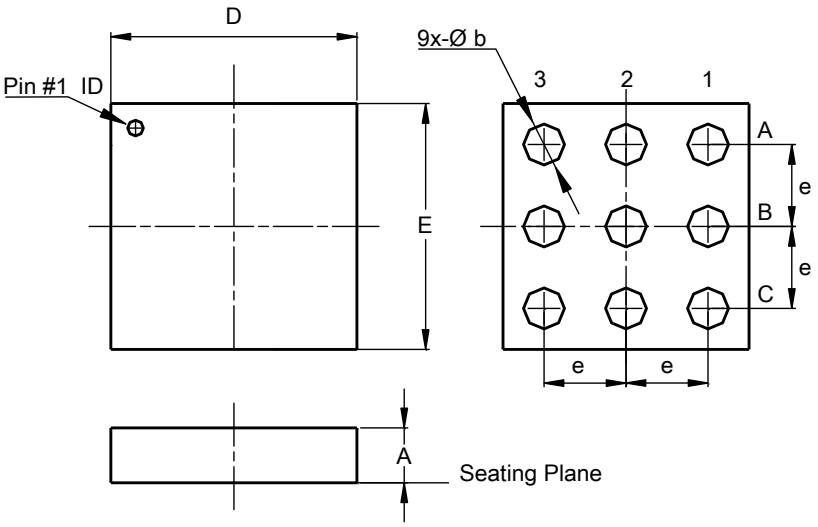


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

X2-DSN1515-9

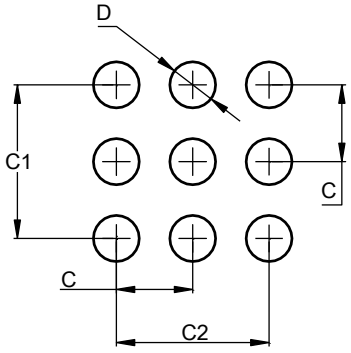


X2-DSN1515-9			
Dim	**Min**	**Max**	**Typ**
A	0.325	0.345	0.335
b	0.235	0.265	0.250
D	1.480	1.530	1.505
E	1.480	1.530	1.505
e	--	--	0.50
All Dimensions in mm			

Suggested Pad Layout

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

X2-DSN1515-9



Dimensions	Value (in mm)
C	0.50
C1	1.00
C2	1.00
D	0.25

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