

N-CHANNEL ENHANCEMENT MODE FIELD MOSFET
Product Summary

V_{SS}	$R_{SS(ON)} \text{ Max}$	I_S $T_A = +25^\circ\text{C}$
24V	36m Ω @ $V_{GS} = 4.5\text{V}$	5A

Description and Applications

This new generation MOSFET is designed to minimize the on-state resistance ($R_{SS(ON)}$) and making it ideal for high efficiency power management.

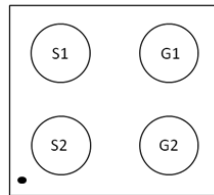
- Battery Management
- Load Switch
- Battery Protection

Features and Benefits

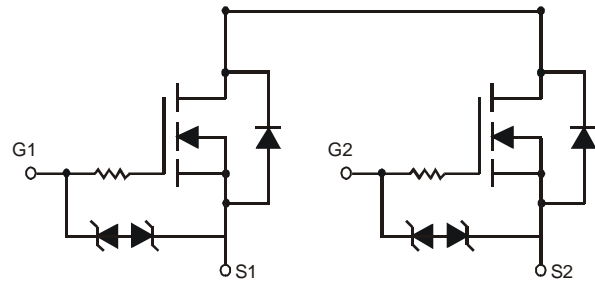
- Built-in G-S Protection Diode against ESD 2kV HBM
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

- Case: X2-WLB1616-4
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminal Material: SnAgCu Ball
- Weight: 0.0023 grams (Approximate)



Top View



N-Channel

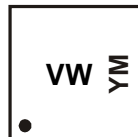
N-Channel

Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2036UCB4-7	X2-WLB1616-4	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


VW/VW = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: F = 2018)
 M = Month (ex: 9 = September)

Date Code Key

Year	2015	2016	2017	2018	2019	2020	2021
Code	C	D	E	F	G	H	I

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

Characteristic			Symbol	Value	Unit
Source-Source Voltage			V_{SSS}	24	V
Gate-Source Voltage			V_{GSS}	± 12	V
Continuous Source Current @ $T_A = +25^\circ\text{C}$ (Note 5)	Steady State	$T_A = +25^\circ\text{C}$	I_S	5.0	A
		$T_A = +70^\circ\text{C}$		4.0	
Pulsed Source Current @ $T_A = +25^\circ\text{C}$ (Notes 5 & 6)			I_{SM}	30	A

Thermal Characteristics

Characteristic			Symbol	Value	Unit
Power Dissipation, @ $T_A = +25^\circ\text{C}$ (Note 5)			P_D	1.45	W
Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 5)			$R_{\theta JA}$	86.68	$^\circ\text{C/W}$
Operating and Storage Temperature Range			T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Source to Source Breakdown Voltage $T_J = +25^\circ\text{C}$	$V_{(BR)SS}$	24	—	—	V	$I_S = 1\text{mA}, V_{GS} = 0\text{V}$
Zero Gate Voltage Source Current $T_J = +25^\circ\text{C}$	I_{SSS}	—	—	1.0	μA	$V_{SS} = 20\text{V}, V_{GS} = 0\text{V}$
Gate-Body Leakage	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 8\text{V}, V_{SS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.5	—	1.3	V	$V_{SS} = 10\text{V}, I_S = 1.0\text{mA}$
Static Source-Source On-Resistance	$R_{SS(ON)}$	20	29	36	m Ω	$V_{GS} = 4.5\text{V}, I_S = 3.0\text{A}$
		20.5	30	37		$V_{GS} = 4.0\text{V}, I_S = 3.0\text{A}$
		21	31	39		$V_{GS} = 3.7\text{V}, I_S = 3.0\text{A}$
		22	33	44		$V_{GS} = 3.1\text{V}, I_S = 3.0\text{A}$
		23	36	52		$V_{GS} = 2.5\text{V}, I_S = 3.0\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	—	9.4	—	S	$V_{SS} = 10\text{V}, I_S = 3.0\text{A}$
Body Diode Forward Voltage	$V_{F(S-S)}$	—	0.8	1.2	V	$I_F = 3.0\text{A}, V_{GS} = 0\text{V}$
DYNAMIC CHARACTERISTICS (Note 8)						
Total Gate Charge	Q_g	—	12.6	—	nC	$V_{GS} = 4.5\text{V}, V_{SS} = 10\text{V}, I_S = 6\text{A}$
Turn-On Delay Time	$t_{D(ON)}$	—	183	—	ns	$V_{DD} = 10\text{V},$ $R_L = 3.33\Omega, I_S = 3.0\text{A}$
Turn-On Rise Time	t_R	—	278	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	738	—	ns	
Turn-Off Fall Time	t_F	—	572	—	ns	

- Notes:
- Device mounted on FR-4 material with 1-inch² (6.45-cm²), 2-oz. (0.071-mm thick) Cu.
 - Repetitive rating, pulse width limited by junction temperature.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

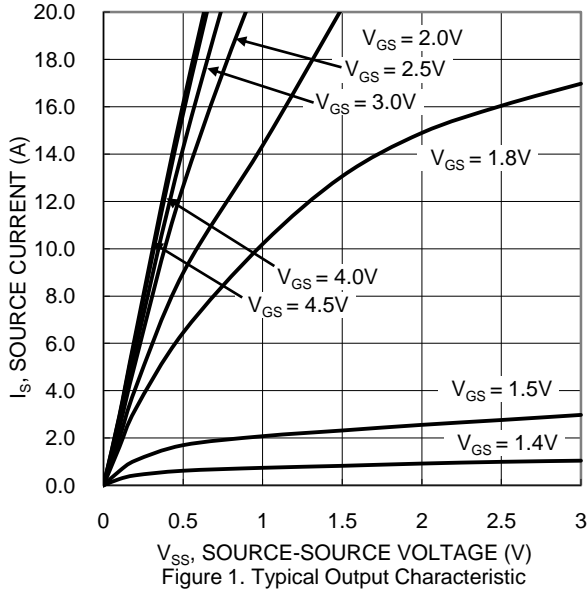


Figure 1. Typical Output Characteristic

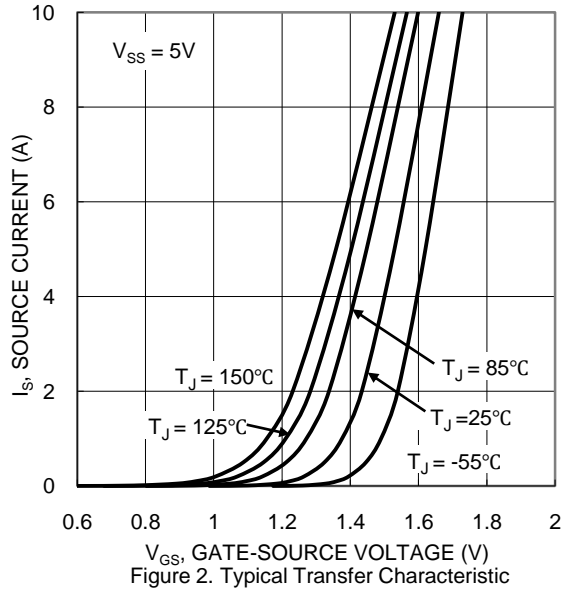


Figure 2. Typical Transfer Characteristic

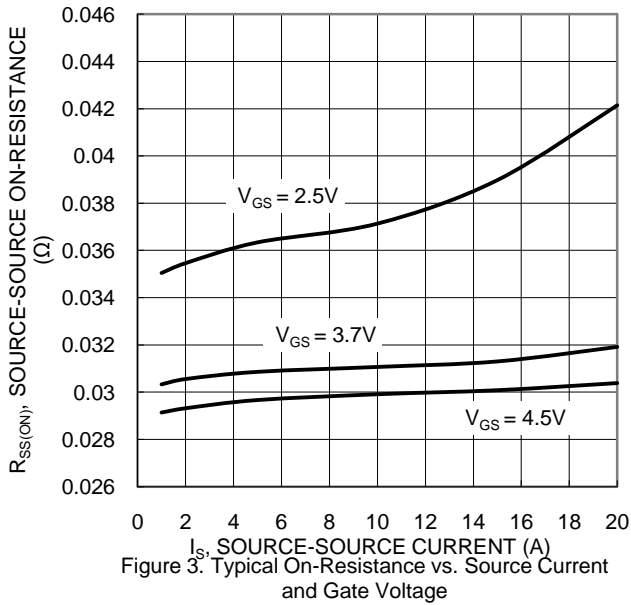


Figure 3. Typical On-Resistance vs. Source Current and Gate Voltage

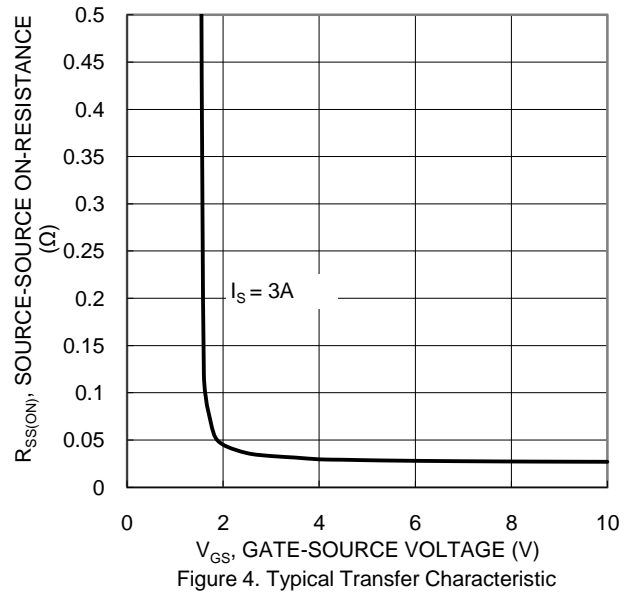


Figure 4. Typical Transfer Characteristic

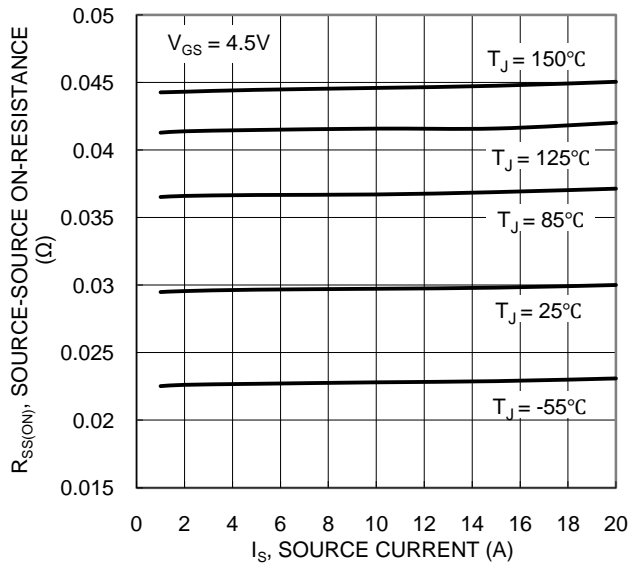


Figure 5. Typical On-Resistance vs. Source Current and Junction Temperature

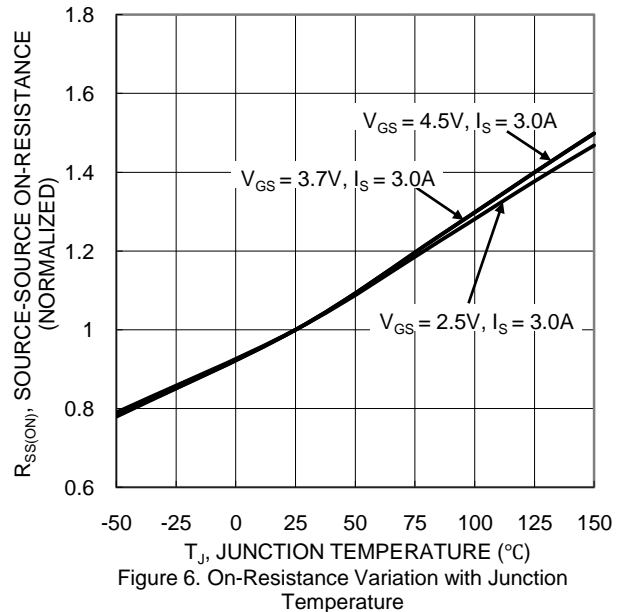
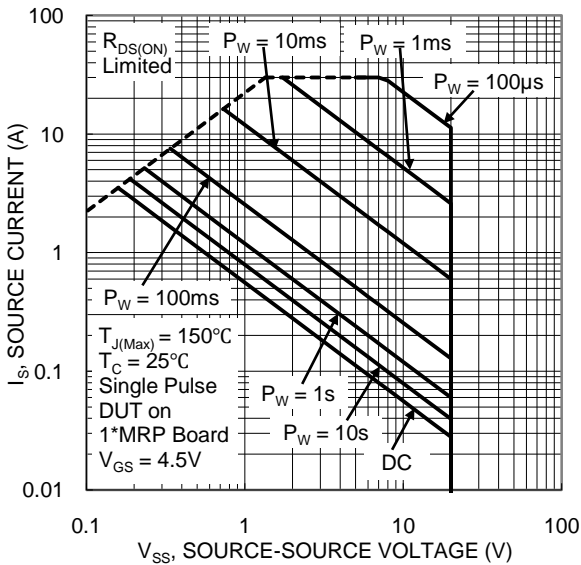
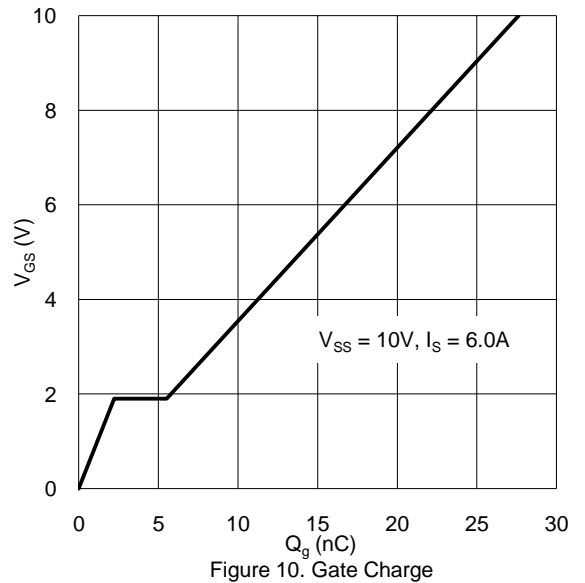
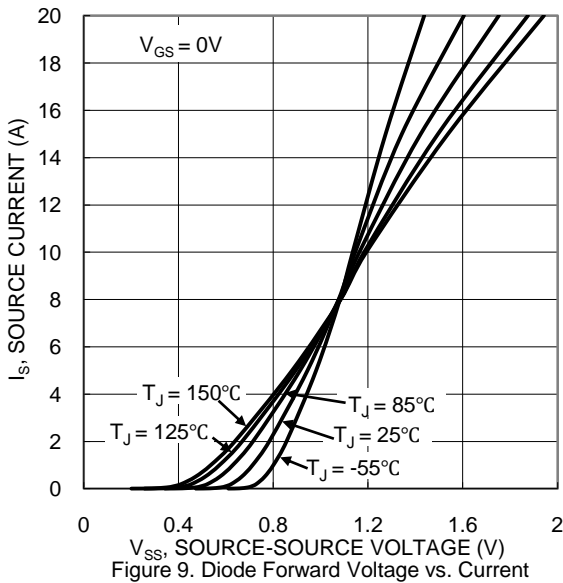
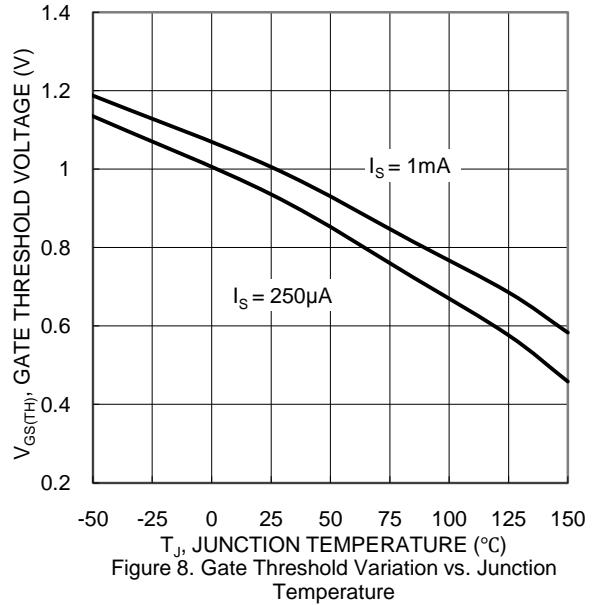
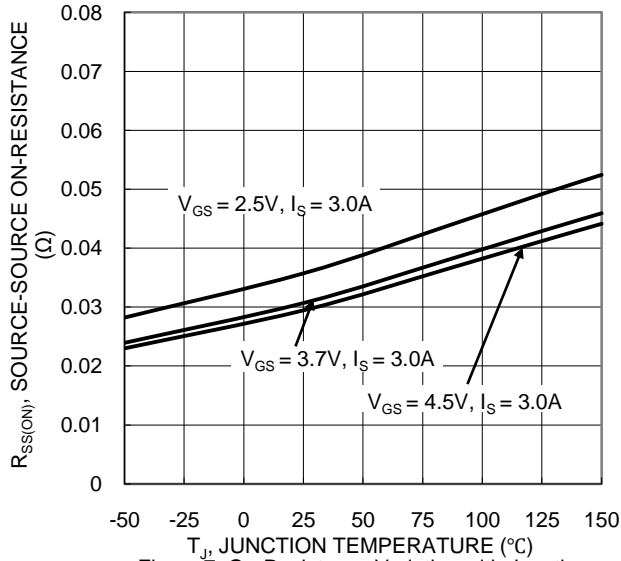


Figure 6. On-Resistance Variation with Junction Temperature



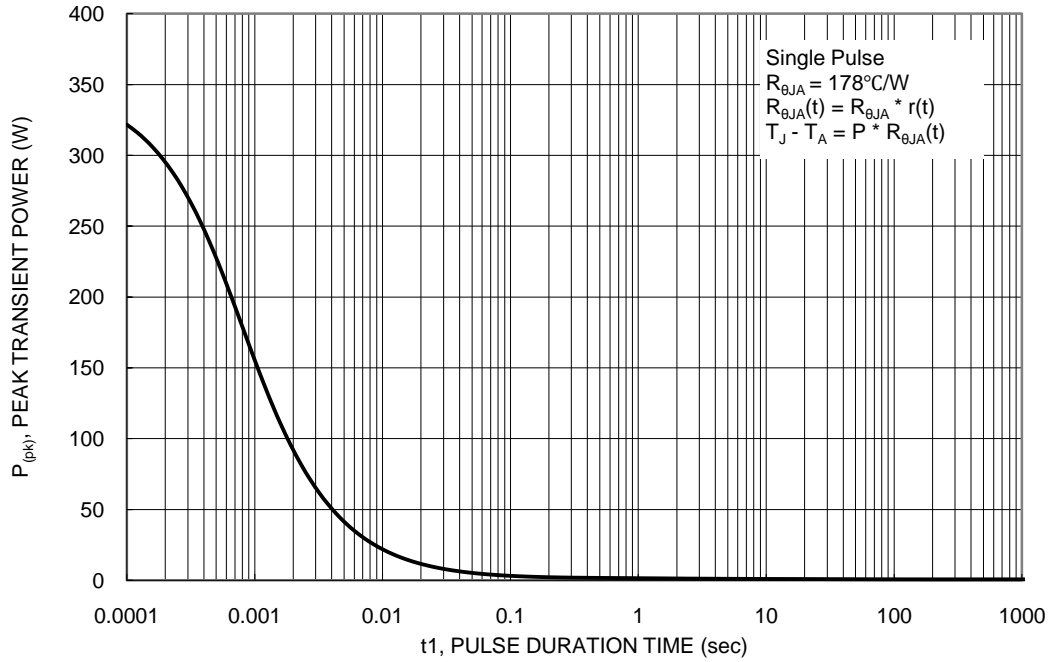


Figure 12. Single Pulse Maximum Power Dissipation

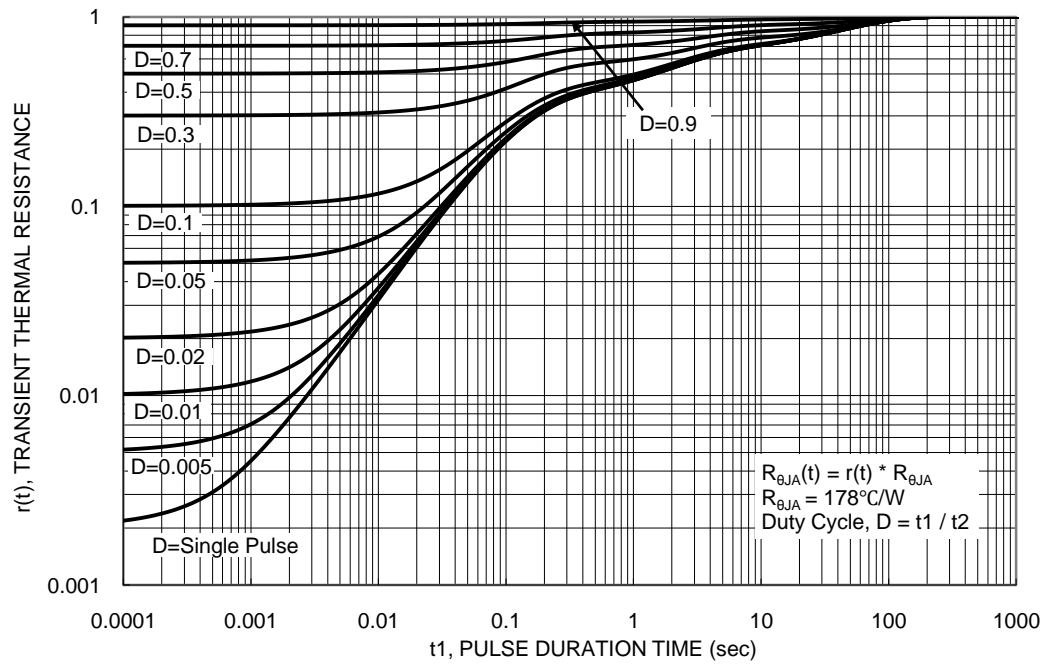
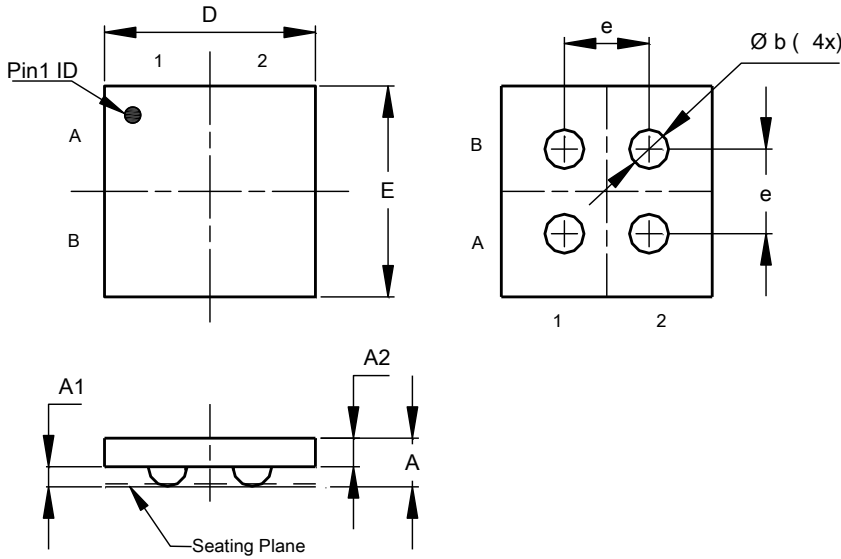


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

X2-WLB1616-4

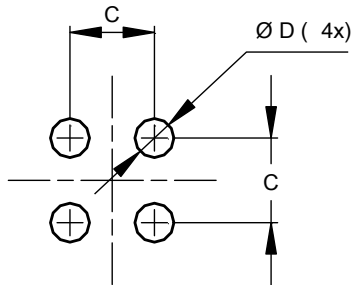


X2-WLB1616-4			
Dim	Min	Max	Typ
A	--	0.40	0.37
A1	--	--	0.15
A2	--	--	0.22
b	0.25	0.35	0.30
D	1.58	1.66	1.62
E	1.58	1.66	1.62
e	-	-	0.65
All Dimensions in mm			

Suggested Pad Layout

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

X2-WLB1616-4



Dimensions	Value (in mm)
C	0.65
D	0.30

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