

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub>	I <sub>D</sub> T <sub>A</sub> = +25°C
20V	0.99Ω @ V <sub>GS</sub> = 4.5V	0.68A
	1.2Ω @ V <sub>GS</sub> = 2.5V	0.62A
	1.8Ω @ V <sub>GS</sub> = 1.8V	0.5A
	2.4Ω @ V <sub>GS</sub> = 1.5V	0.43

## Description and Applications

This new generation MOSFET is 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.

- Power management functions
- Backlighting
- Load switches

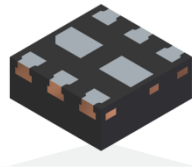
## Features

- Low On-Resistance
- Low Input/Output Leakage
- Fast Switching Speed
- ESD Protected 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](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

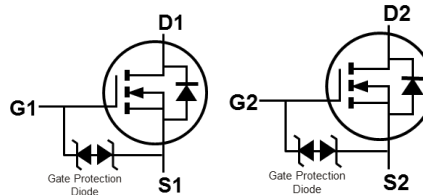
## Mechanical Data

- Package: X2-DFN1010-6
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – NiPdAu over Copper Leadframe; Solderable per MIL-STD-202, Method 208
- Weight: 0.0015 grams (Approximate)

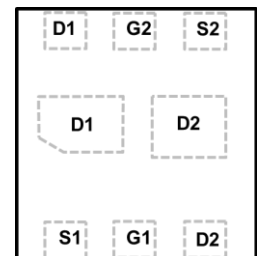
X2-DFN1010-6 (Type UXC)



Bottom View



Equivalent Circuit



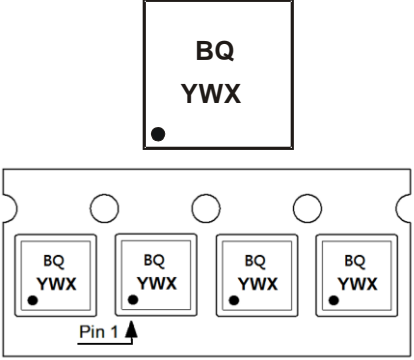
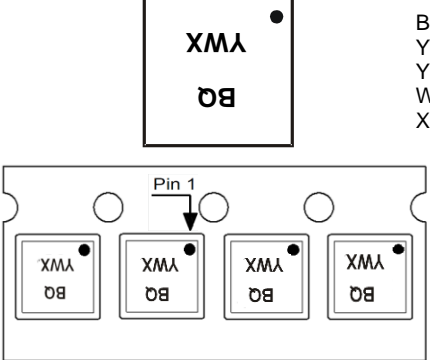
Pin-out Top View

## Ordering Information (Note 4)

Part Number	Package	Tape Width (mm)	Tape Pitch (mm)	Packing	
				Qty.	Carrier
DMN2991UDR4-7	X2-DFN1010-6 (Type UXC)	8	4	5000	Tape & Reel
DMN2991UDR4-7R	X2-DFN1010-6 (Type UXC)	8	4	5000	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**

<p>DMN2991UDR4-7</p>	 <p>BQ = Product Type Marking Code YWX = Date Code Marking Y = Year (ex: 2 = 2022) W = Week (ex: a = Week 27; z Represents Week 52 and 53) X = Internal Code (ex: U = Monday)</p>
<p>DMN2991UDR4-7R</p>	 <p>BQ = Product Type Marking Code YWX = Date Code Marking Y = Year (ex: 2 = 2022) W = Week (ex: a = Week 27; z Represents Week 52 and 53) X = Internal Code (ex: U = Monday)</p>

Date Code Key

<b>Year</b>	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
<b>Code</b>	2	3	4	5	6	7	8	9	0	1	2	3
<b>Week</b>	1-26			27-52			53					
<b>Code</b>	A-Z			a-z			z					
<b>Internal Code</b>	Sun	Mon	Tue	Wed	Thu	Fri	Sat					
<b>Code</b>	T	U	V	W	X	Y	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>	±8	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +100°C	I <sub>D</sub>	0.5 0.4	A
Maximum Continuous Body Diode Forward Current (Note 5)			I <sub>S</sub>	0.4	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	1.4	A

**Thermal Characteristics**

Characteristic			Symbol	Value	Unit
Total Power Dissipation (Note 5)			P <sub>D</sub>	0.38	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State		R <sub>θJA</sub>	331	°C/W
Total Power Dissipation (Note 6)			P <sub>D</sub>	0.7	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State		R <sub>θJA</sub>	180	°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> = 10µA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±10	µA	V <sub>GS</sub> = ±5V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.4	—	1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	0.5	0.99	Ω	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 100mA
		—	0.6	1.2		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 50mA
		—	0.7	1.8		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 20mA
		—	0.9	2.4		V <sub>GS</sub> = 1.5V, I <sub>D</sub> = 10mA
		—	—	—		—
Diode Forward Voltage	V <sub>SD</sub>	—	0.8	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 150mA
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>ISS</sub>	—	14.6	—	pF	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>OSS</sub>	—	4.7	—		
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	3.2	—		
Total Gate Charge	Q <sub>g</sub>	—	0.28	—	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V I <sub>D</sub> = 250mA
Gate-Source Charge	Q <sub>gs</sub>	—	0.04	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	0.1	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	7.1	—	ns	V <sub>DD</sub> = 10V, V <sub>GS</sub> = 4.5V R <sub>L</sub> = 47Ω, R <sub>G</sub> = 10Ω I <sub>D</sub> = 200mA
Turn-On Rise Time	t <sub>r</sub>	—	18	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	125	—		
Turn-Off Fall Time	t <sub>f</sub>	—	56.9	—		

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

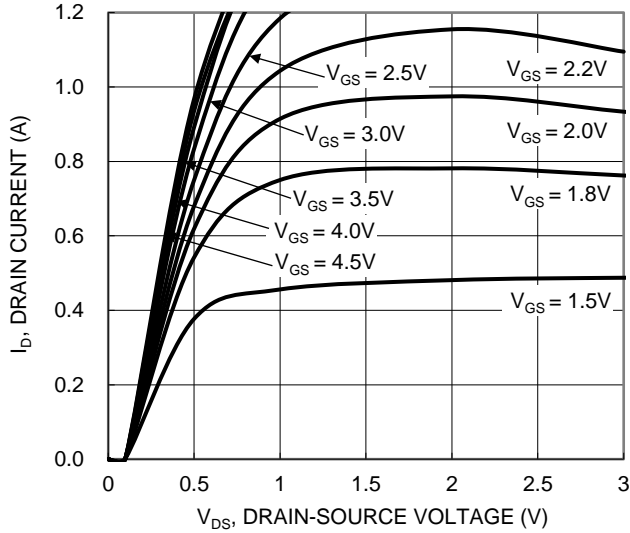


Figure 1. Typical Output Characteristic

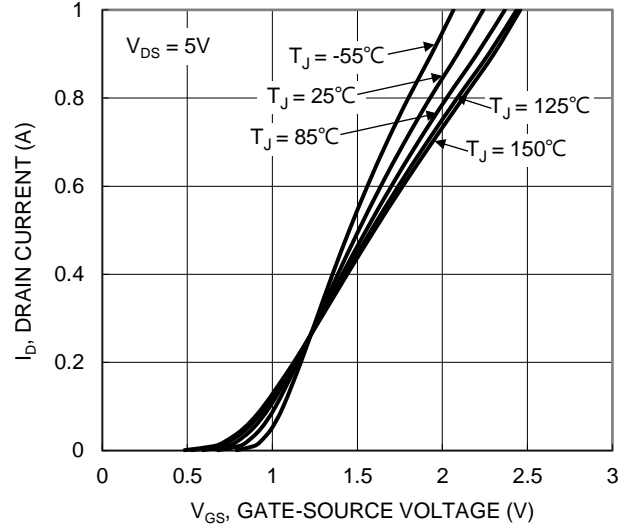


Figure 2. Typical Transfer Characteristic

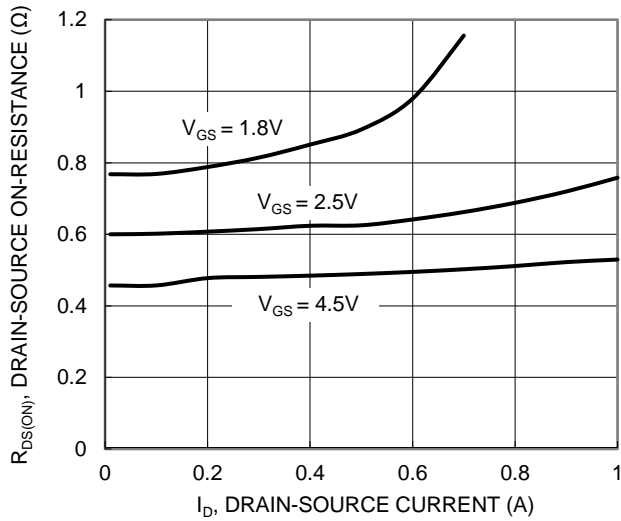


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

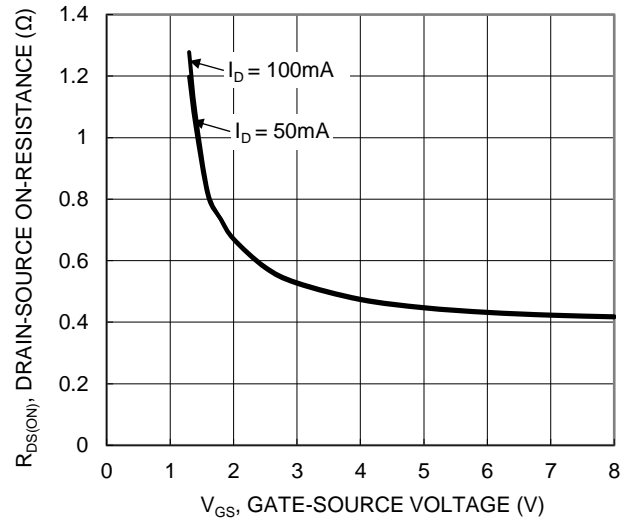


Figure 4. Typical Transfer Characteristic

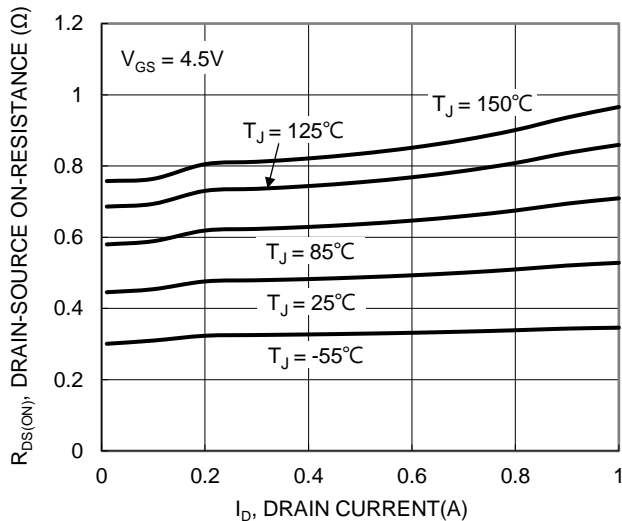


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

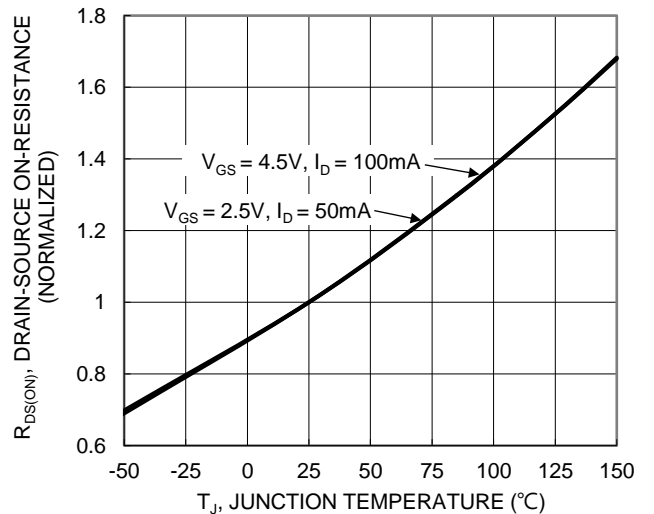


Figure 6. On-Resistance Variation with Junction Temperature

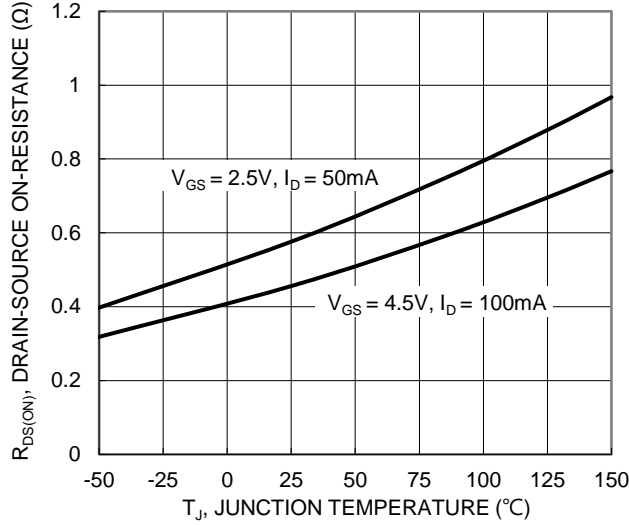


Figure 7. On-Resistance Variation with Junction Temperature

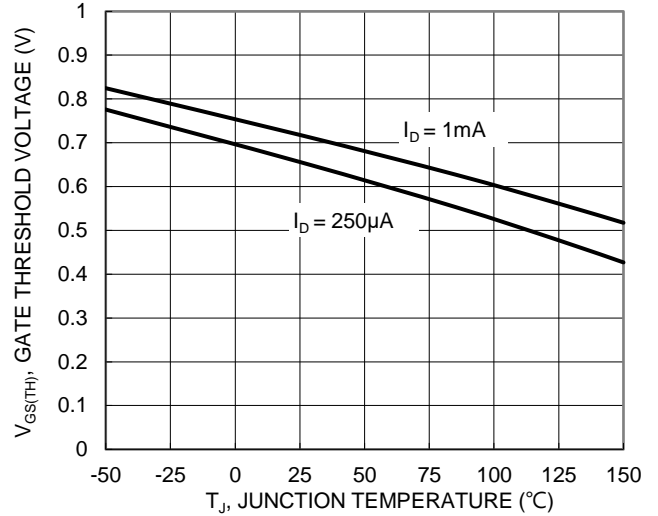


Figure 8. Gate Threshold Variation vs. Junction Temperature

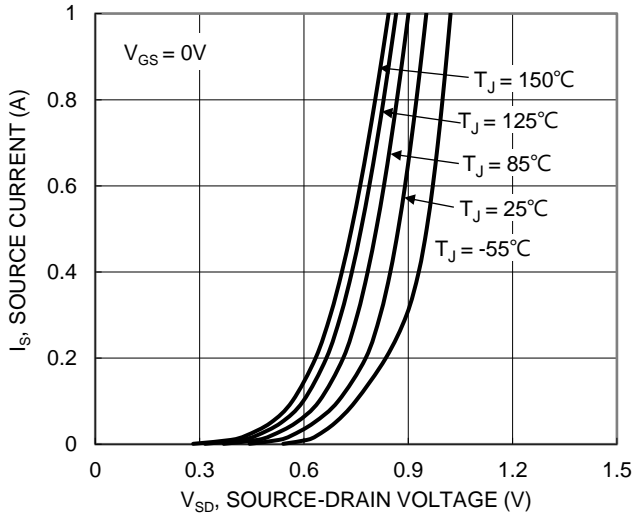


Figure 9. Diode Forward Voltage vs. Current

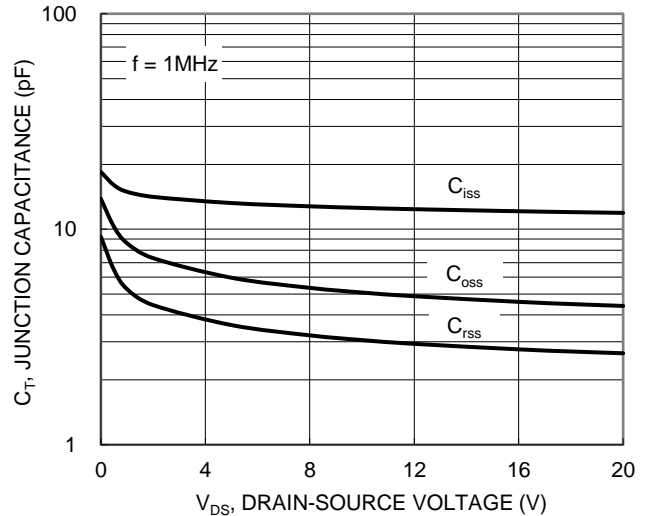


Figure 10. Typical Junction Capacitance

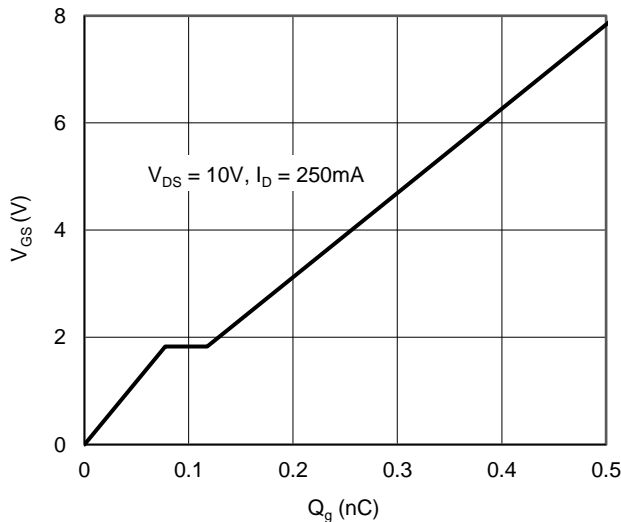


Figure 11. Gate Charge

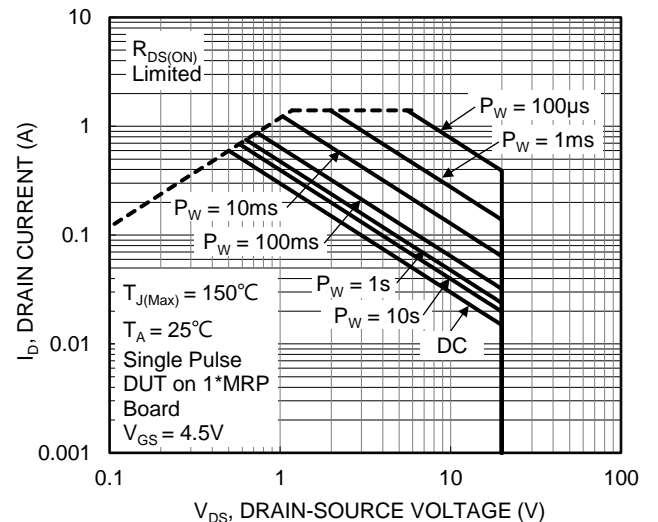


Figure 12. SOA, Safe Operation Area

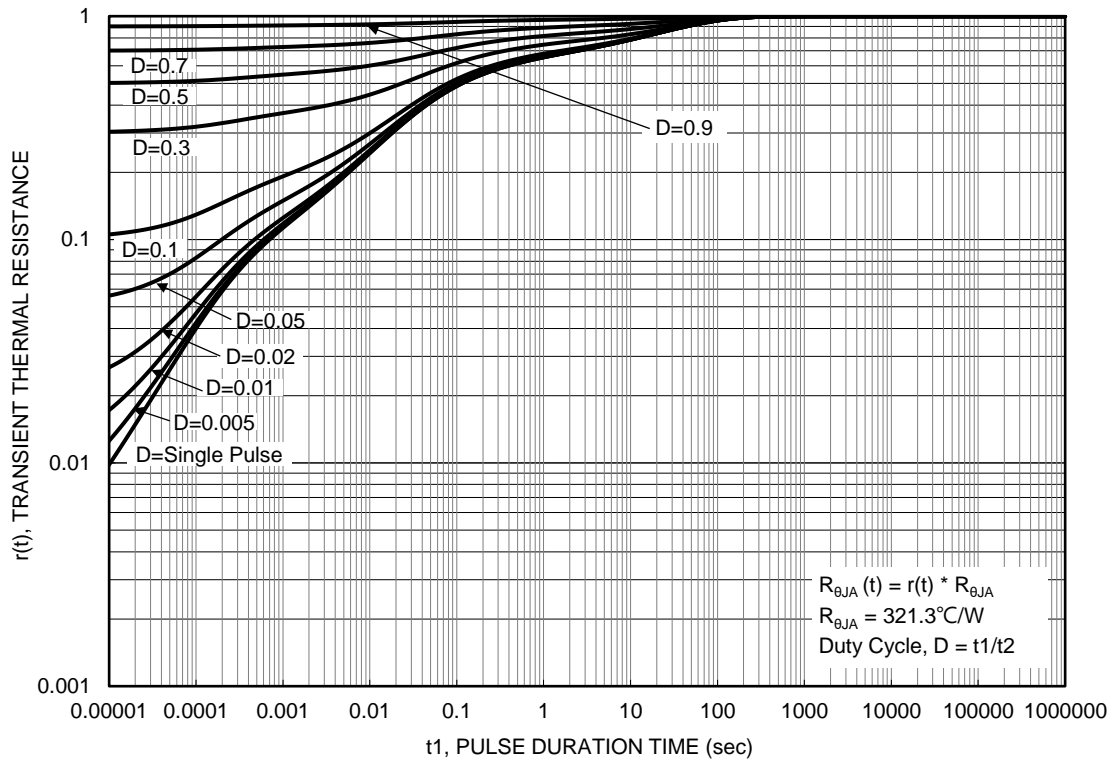
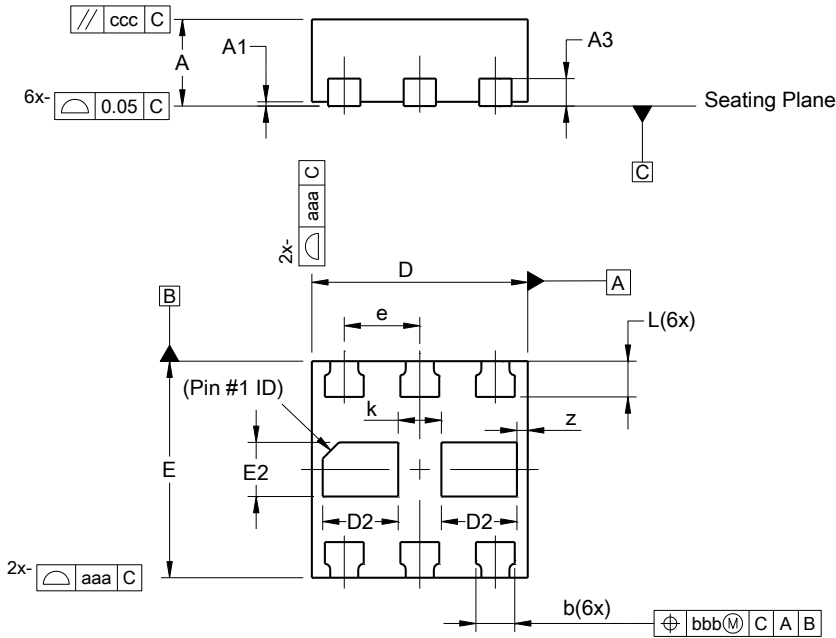


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**X2-DFN1010-6 (Type UXC)**

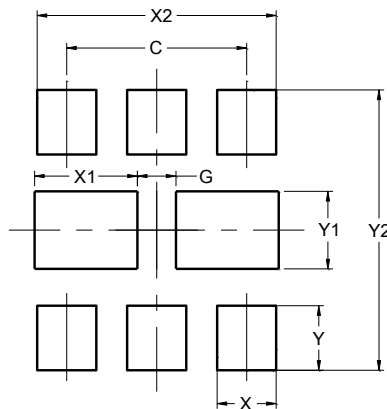


X2-DFN1010-6 (Type UXC)			
Dim	Min	Max	Typ
A	--	0.40	0.39
A1	--	0.05	--
A3	--	--	0.127
b	0.13	0.23	0.18
D	0.95	1.05	1.00
D2	0.30	0.40	0.35
E	0.95	1.05	1.00
E2	0.20	0.30	0.25
e	0.350 BSC		
L	0.115	0.215	0.165
k	--	--	0.20
z	0.02	0.08	0.05
aaa	0.08		
bbb	0.07		
ccc	0.05		
All Dimensions in mm			

**Suggested Pad Layout**

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

**X2-DFN1010-6 (Type UXC)**



Dimensions	Value (in mm)
C	0.700
G	0.300
X	0.230
X1	0.450
X2	0.930
Y	0.250
Y1	0.300
Y2	1.085

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