

**DUAL N-CHANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

Device	BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>A</sub> = +25°C
N-Channel	12V	150mΩ @ V <sub>GS</sub> = 4.5V	2.0A
		185mΩ @ V <sub>GS</sub> = 2.5V	1.8A

**Features and Benefits**

- Footprint of just 1.3 mm<sup>2</sup>
- Ultra-Low Profile Package – 0.35mm Profile
- Low Gate Threshold Voltage
- Fast Switching Speed
- Ultra-Small Surface Mount Package
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

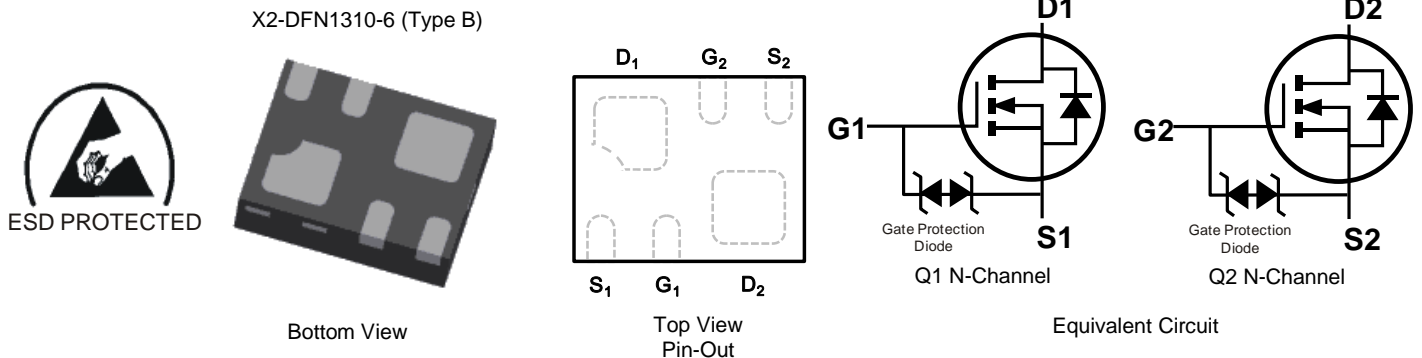
**Description and Applications**

This 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.

- Motor Control
- Power Management Functions
- Backlighting

**Mechanical Data**

- Case: X2-DFN1310-6 (Type B)
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e4)
- Weight: 0.002 grams (Approximate)

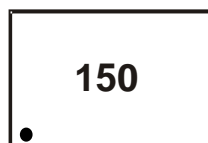


**Ordering Information (Note 4)**

Part Number	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DMN1150UFL3-7	7	8	3,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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 <http://www.diodes.com/products/packages.html>.

**Marking Information**



150 = Product Type Marking Code

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	12	V
Gate-Source Voltage			V <sub>GSS</sub>	±6	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	2.0	A
		T <sub>A</sub> = +70°C		1.6	

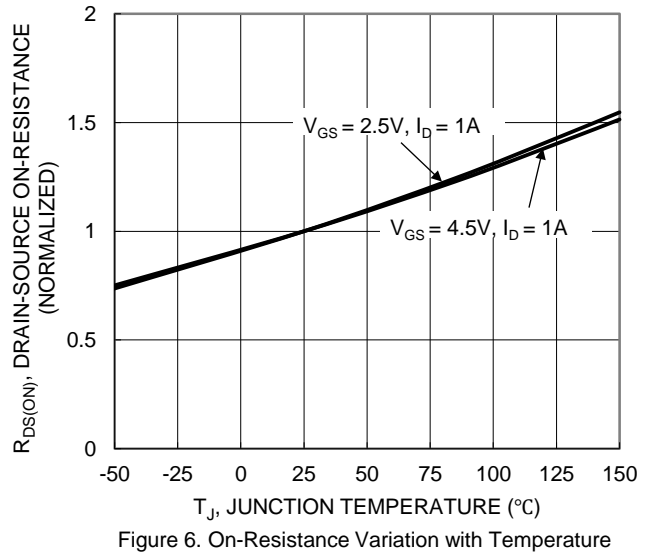
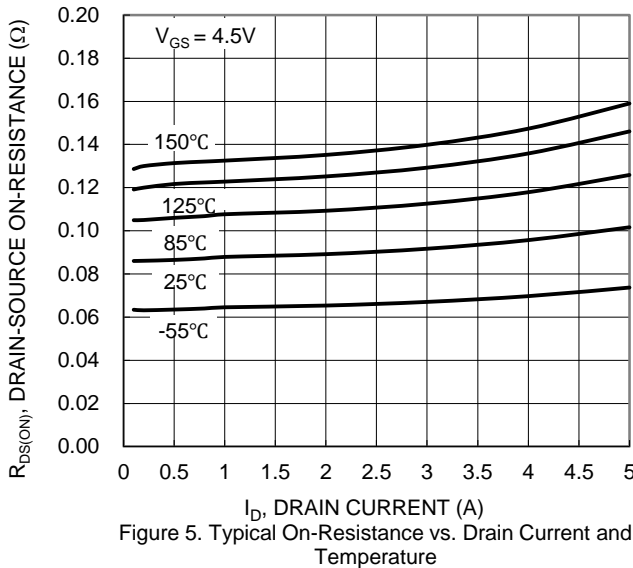
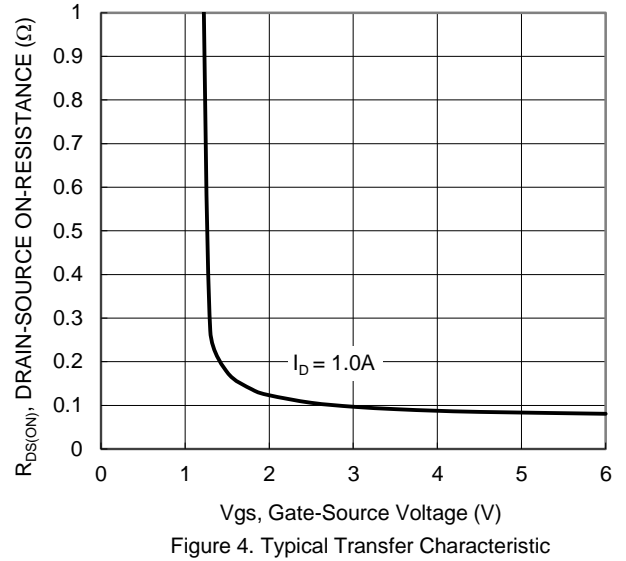
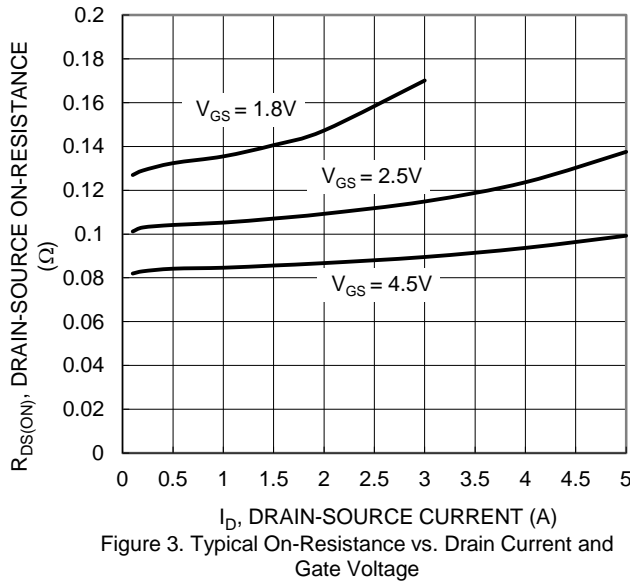
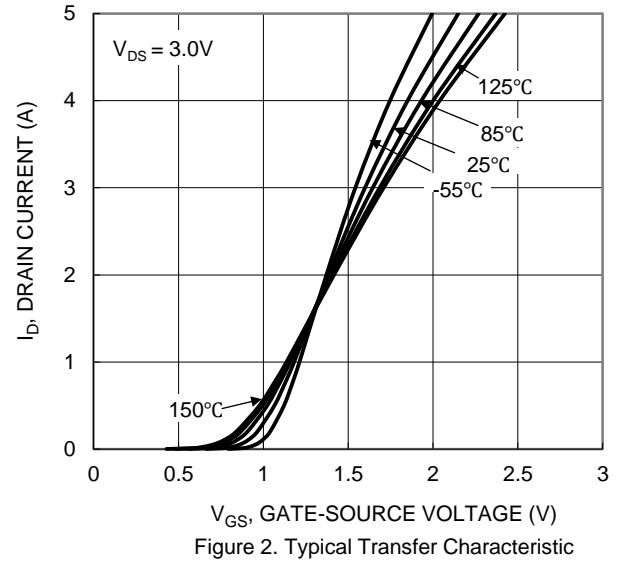
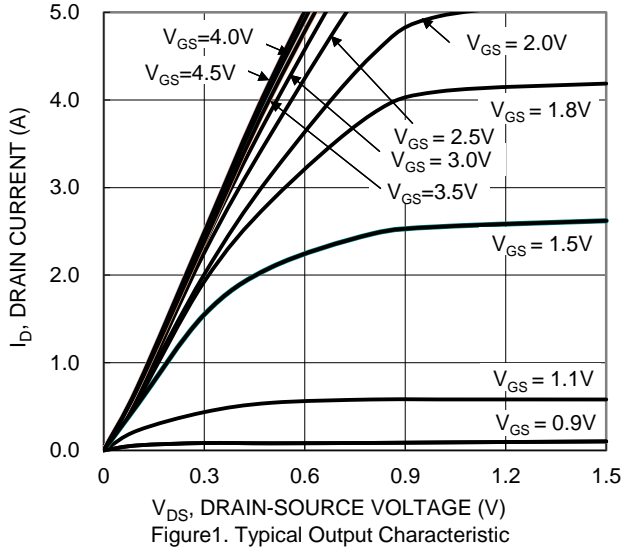
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	0.39	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	320	°C/W
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	0.9	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	141	°C/W
Thermal Resistance, Junction to Case (Note 6)		R <sub>θJC</sub>	49	
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</b> (Note 7)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	12	—	—	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> = 12V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±10	μA	V <sub>GS</sub> = ±6V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 7)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.35	0.42	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>	—	119	150	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 1A
			141	185		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 1A
			175	210		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 1A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 150mA
<b>DYNAMIC CHARACTERISTICS</b> (Note 8)						
Input Capacitance	C <sub>ISS</sub>	—	115	—	pF	V <sub>DS</sub> = 6V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>OSS</sub>	—	25	—	pF	
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	23	—	pF	
Gate Resistance	R <sub>G</sub>	—	90	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge	Q <sub>G</sub>	—	1.4	—	nC	V <sub>DS</sub> = 4V, V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 1A
Gate-Source Charge	Q <sub>GS</sub>	—	0.1	—	nC	
Gate-Drain Charge	Q <sub>GD</sub>	—	0.1	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	4.0	—	ns	V <sub>GS</sub> = 6V, V <sub>DS</sub> = 4V, R <sub>G</sub> = 1Ω, I <sub>D</sub> = 1A
Turn-On Rise Time	t <sub>R</sub>	—	7.4	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	44	—	ns	
Turn-Off Fall Time	t <sub>F</sub>	—	19	—	ns	

- 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 product testing.



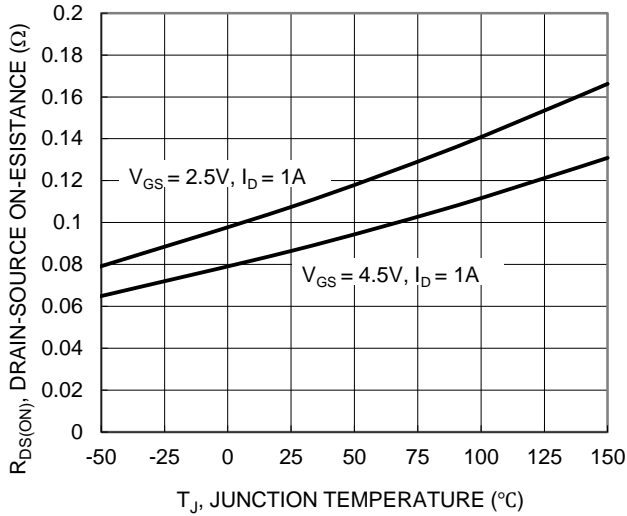


Figure 7. On-Resistance Variation with Temperature

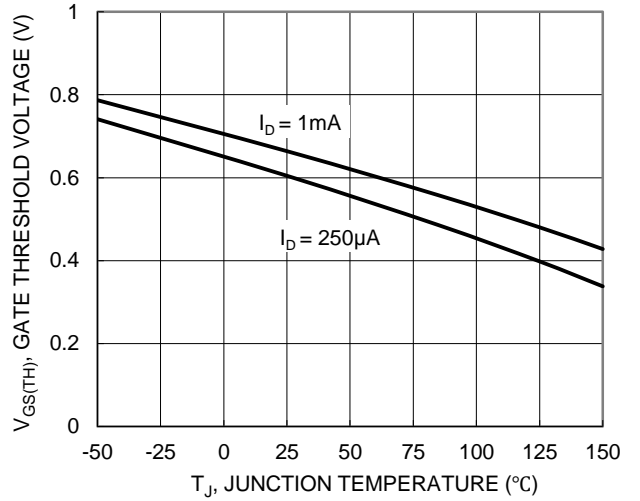


Figure 8. Gate Threshold Variation vs. junction Temperature

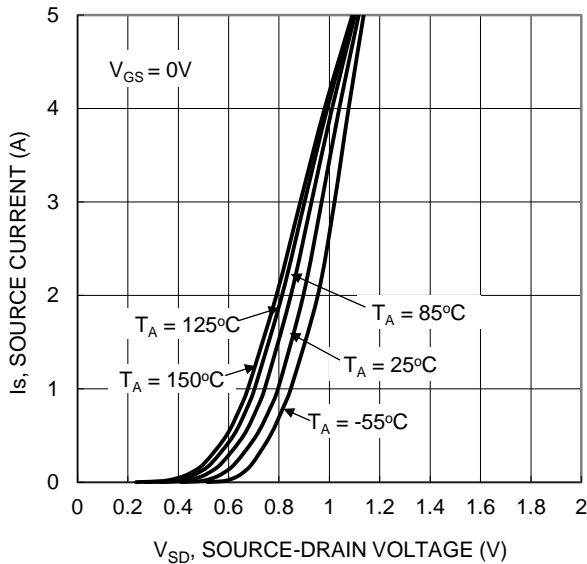


Figure 9. Diode Forward Voltage vs. Current

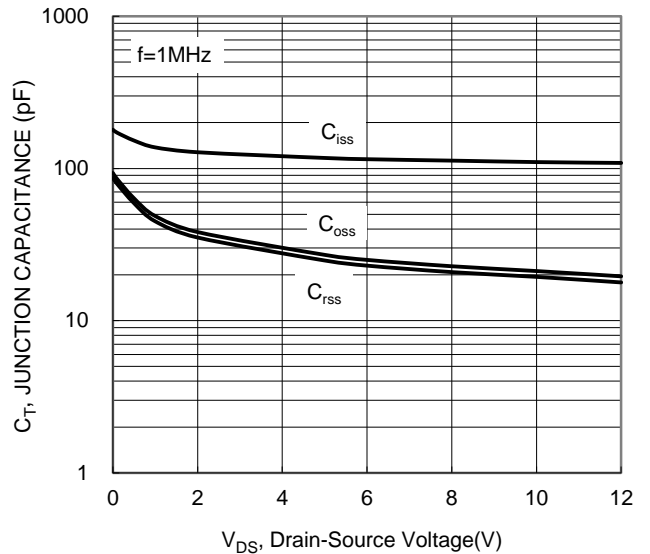


Figure 10. Typical Junction Capacitance

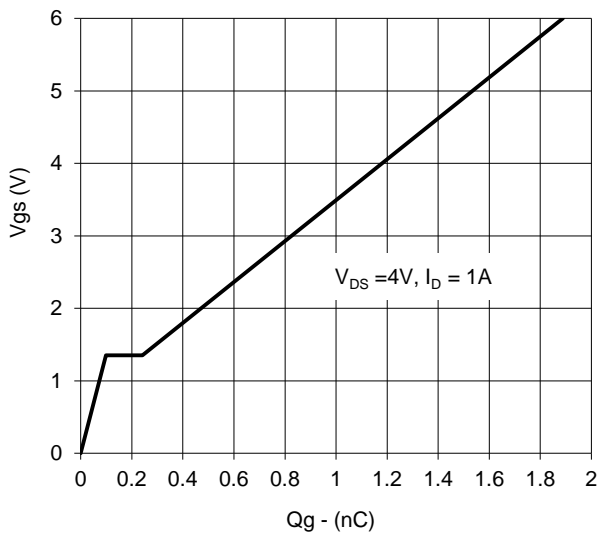


Figure 11. Gate Charge

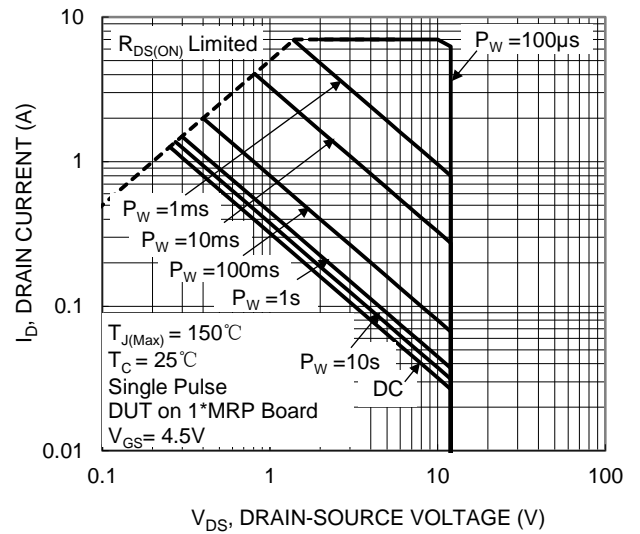


Figure 12. SOA, Safe Operation Area

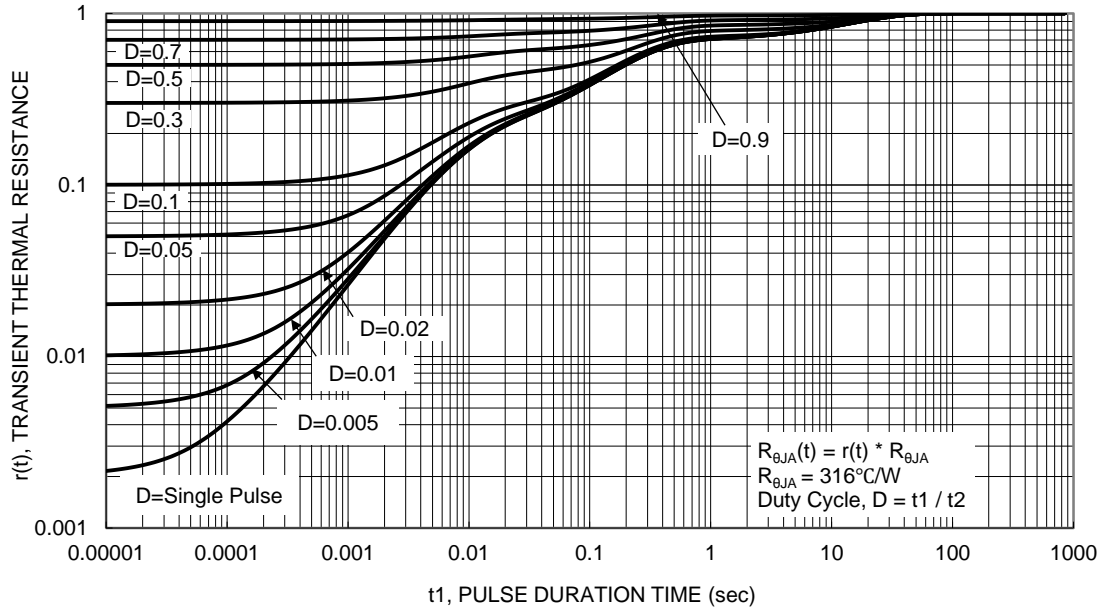
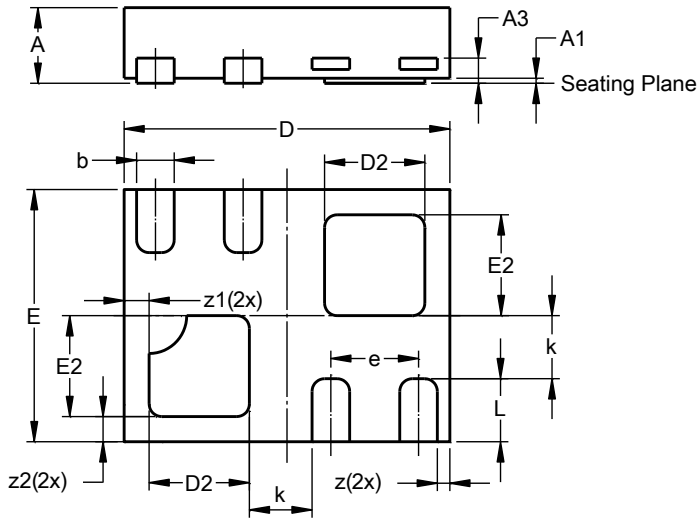


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**X2-DFN1310-6 (Type B)**

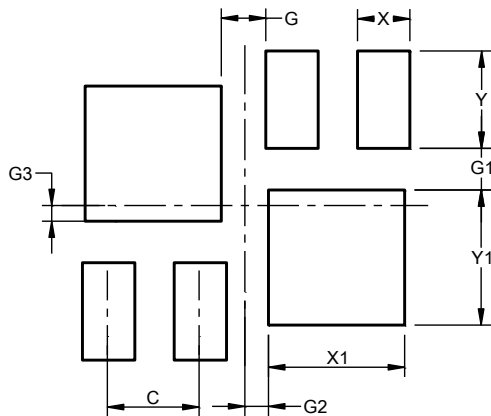


X2-DFN1310-6 (Type B)			
Dim	Min	Max	Typ
A	0.25	0.35	0.30
A1	0	0.05	0.02
A3	--	--	0.100
b	0.10	0.20	0.15
D	1.25	1.35	1.30
D2	0.30	0.50	0.40
E	0.95	1.05	1.00
E2	0.30	0.50	0.40
e	--	--	0.35
k	0.15	--	--
L	0.20	0.30	0.25
z	--	--	0.05
z1	--	--	0.10
z2	--	--	0.10
All Dimensions in mm			

**Suggested Pad Layout**

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

**X2-DFN1310-6 (Type B)**



Dimensions	Value (in mm)
C	0.350
G	0.17
G1	0.16
G2	0.09
G3	0.06
X	0.20
X1	0.52
Y	0.375
Y1	0.52

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