

Product Summary

BV _{DSS}	Max R _{DS(ON)}	I _{D max} T _A = +25°C (Note 6)
20V	195mΩ @ V _{GS} = 4.5V	2.11A
	260mΩ @ V _{GS} = 2.5V	1.83A
	380mΩ @ V _{GS} = 1.8V	1.51A
	520mΩ @ V _{GS} = 1.5V	1.29A

Description and Applications

This MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Load Switch

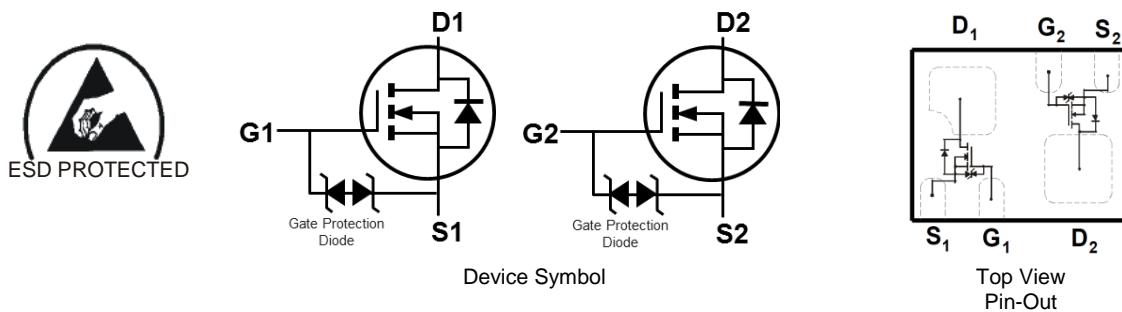
Features and Benefits

- Footprint of Just 1.3mm²
- Ultra Low Profile Package — 0.4mm Profile
- On Resistance <200mΩ
- 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)**

Mechanical Data

- Case: X2-DFN1310-6
- 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 208④

X2-DFN1310-6



Ordering Information (Note 4)

Part Number	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
DMN2300UFL4-7	23N	7	8	3000

- 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



23N = Product Type Marking Code

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}	±8	V
Continuous Drain Current (Note 6)	Steady State	T _A = +25°C	I _D	2.11	A
		T _A = +85°C		1.19	
Pulsed Drain Current (Note 7)			I _{DM}	6.0	A

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

Characteristic			Symbol	Value	Unit
Power Dissipation	(Note 5)	P _D	P _D	0.53	W
	(Note 6)			1.39	
Thermal Resistance, Junction to Ambient	(Note 5)	R _{θJA}	R _{θJA}	238	°C/W
	(Note 6)			90	
Operating and Storage Temperature Range			T _J , T _{STG}	-55 to +150	°C

- Notes:
- 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - 6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1 inch square copper plate.
 - 7. Device mounted on minimum recommended pad layout test board, 10µs pulse duty cycle = 1%.

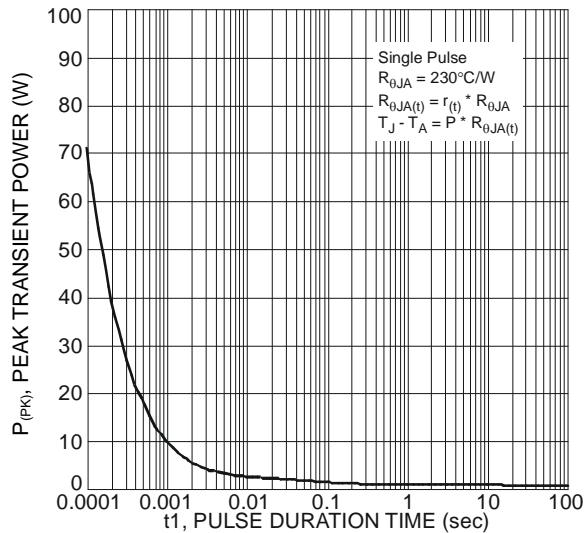


Fig. 1 Single Pulse Maximum Power Dissipation

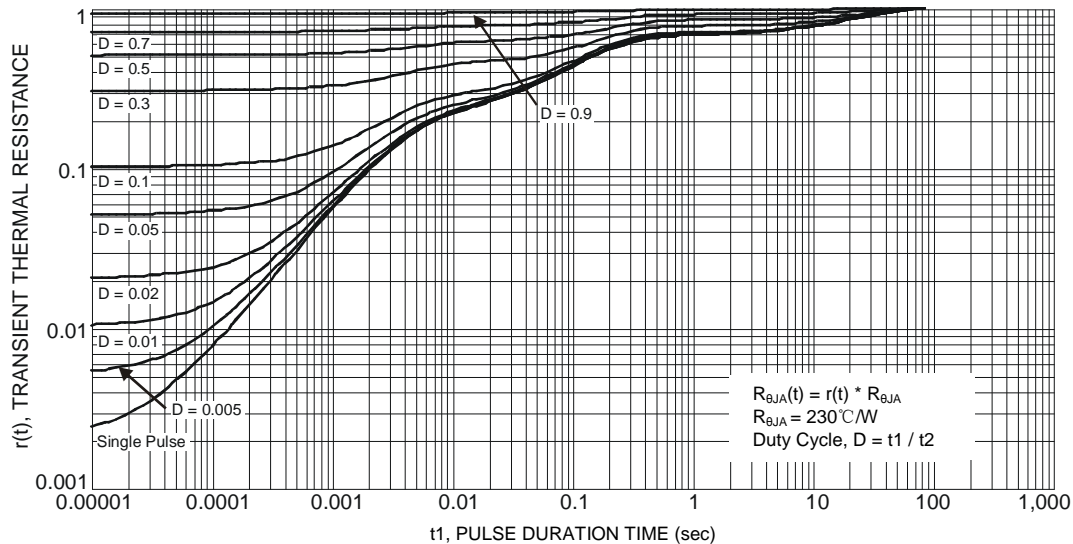


Fig. 2 Transient Thermal Resistance

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 _{DSS}	20	—	—	V	V _{GS} = 0V, I _D = 10μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	1	μA	V _{DS} = 20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	10	μA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(TH)}	0.45	—	0.95	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	151	195	mΩ	V _{GS} = 4.5V, I _D = 300mA
		—	190	260		V _{GS} = 2.5V, I _D = 250mA
		—	247	380		V _{GS} = 1.8V, I _D = 100mA
		—	316	520		V _{GS} = 1.5V, I _D = 50mA
		—	—	—		—
Forward Transfer Admittance	Y _{fs}	40	—	—	mS	V _{DS} = 3V, I _D = 30mA
Diode Forward Voltage	V _{SD}	—	0.7	1.2	V	V _{GS} = 0V, I _S = 300mA
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{iss}	—	67.6	135.2	pF	V _{DS} = 20V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	9.7	19.4	pF	
Reverse Transfer Capacitance	C _{rss}	—	7.5	15	pF	
Gate Resistance	R _g	—	70	140	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge	Q _g	—	1.6	3.2	nC	V _{GS} = 4.5V, V _{DS} = 15V, I _D = 1A
Gate-Source Charge	Q _{gs}	—	0.2	0.4	nC	
Gate-Drain Charge	Q _{gd}	—	0.2	0.4	nC	
Turn-On Delay Time	t _{D(ON)}	—	3.5	10	ns	V _{DS} = 10V, I _D = 1A V _{GS} = 10V, R _G = 6Ω
Turn-On Rise Time	t _R	—	2.8	10	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	38	60	ns	
Turn-Off Fall Time	t _F	—	13	25	ns	

Note: 8. Short duration pulse test used to minimize self-heating effect.

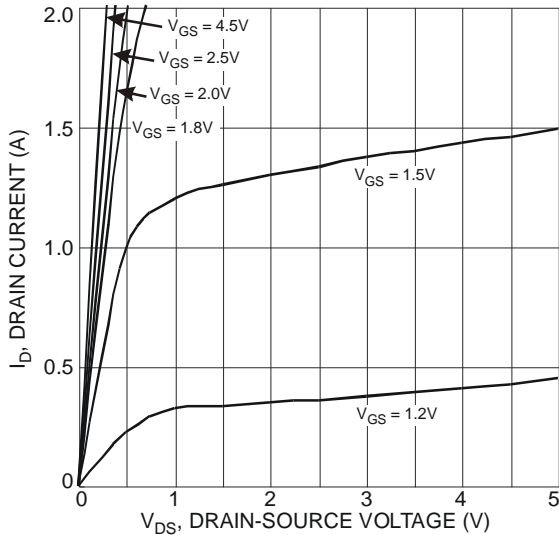


Fig. 3 Typical Output Characteristic

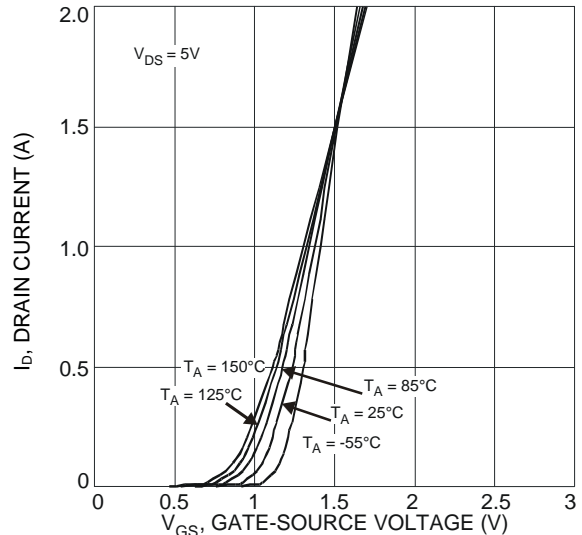


Fig. 4 Typical Transfer Characteristic

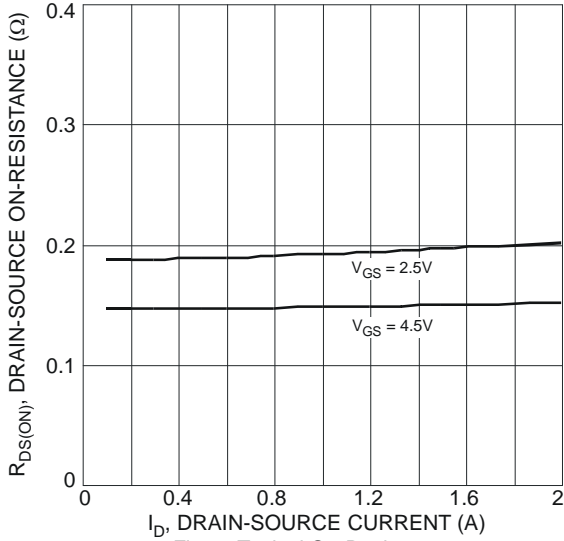


Fig. 5 Typical On-Resistance vs. Drain Current and Gate Voltage

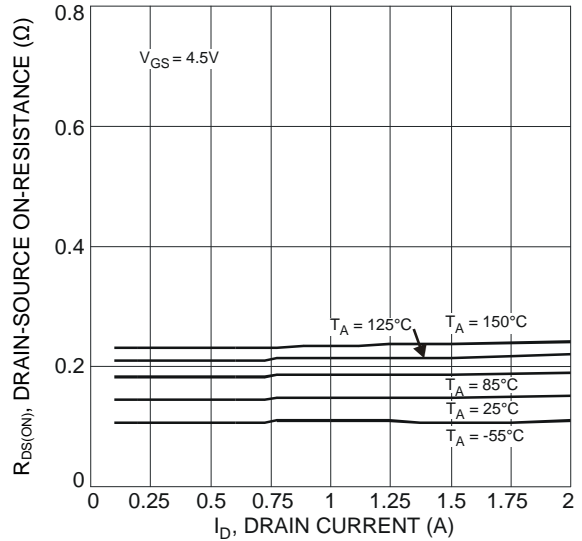


Fig. 6 Typical On-Resistance vs. Drain Current and Temperature

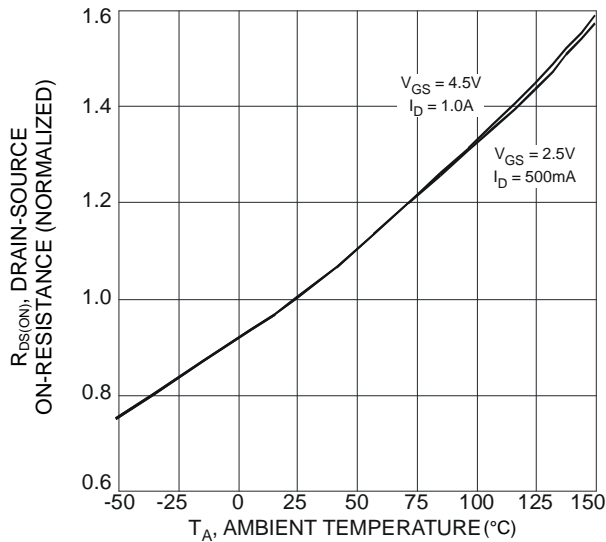


Fig. 7 On-Resistance Variation with Temperature

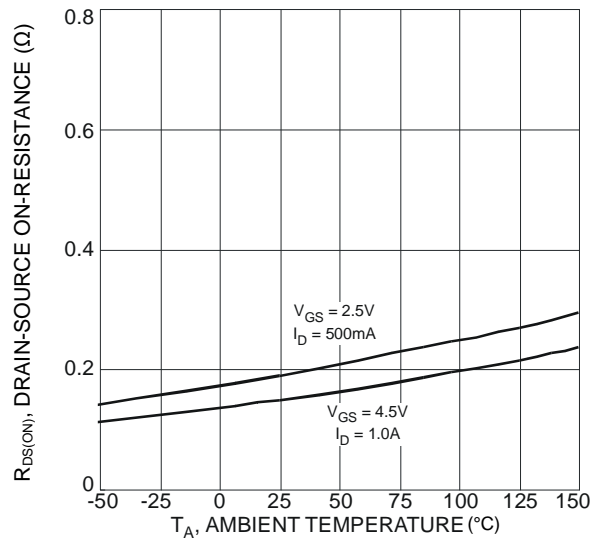


Fig. 8 On-Resistance Variation with Temperature

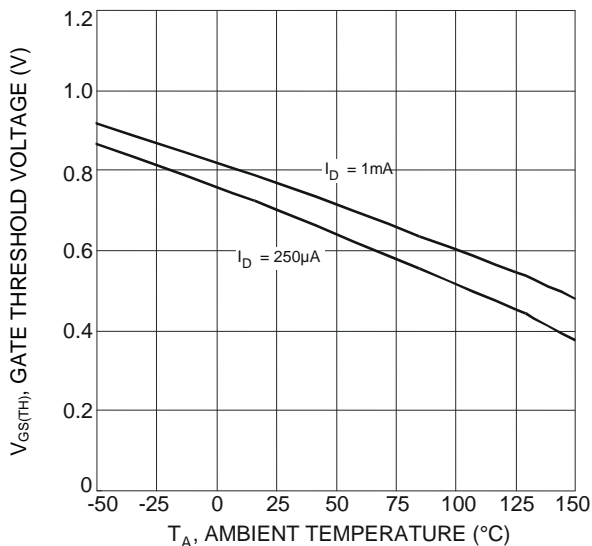


Fig. 9 Gate Threshold Variation vs. Ambient Temperature

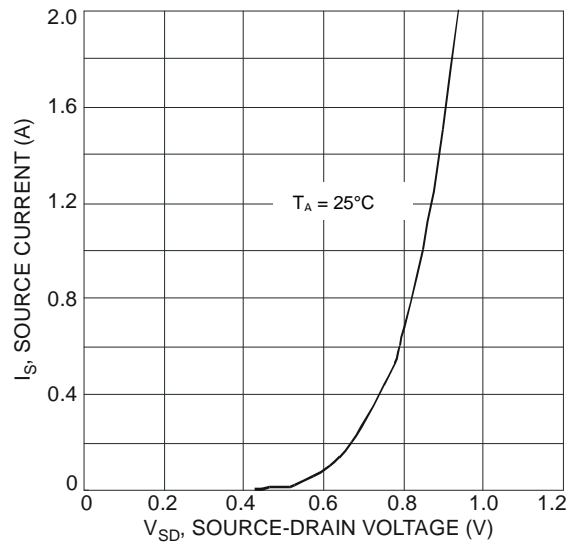


Fig. 10 Diode Forward Voltage vs. Current

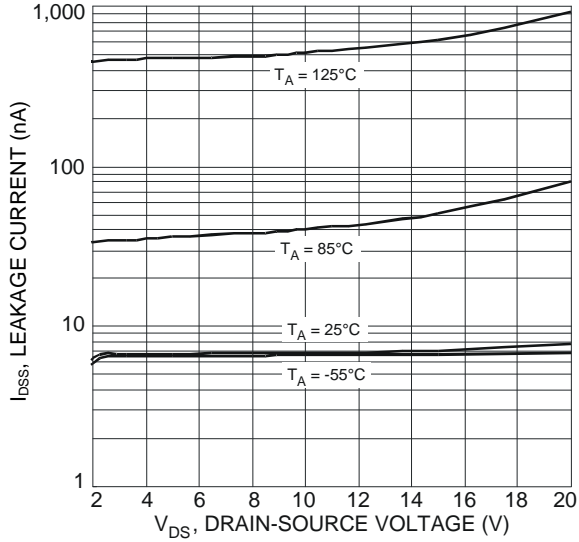


Fig. 11 Typical Leakage Current vs. Drain-Source Voltage

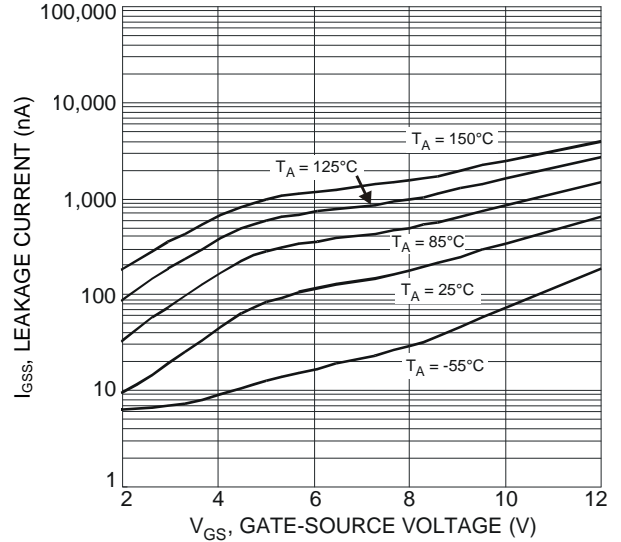


Fig. 12 Leakage Current vs. Gate-Source Voltage

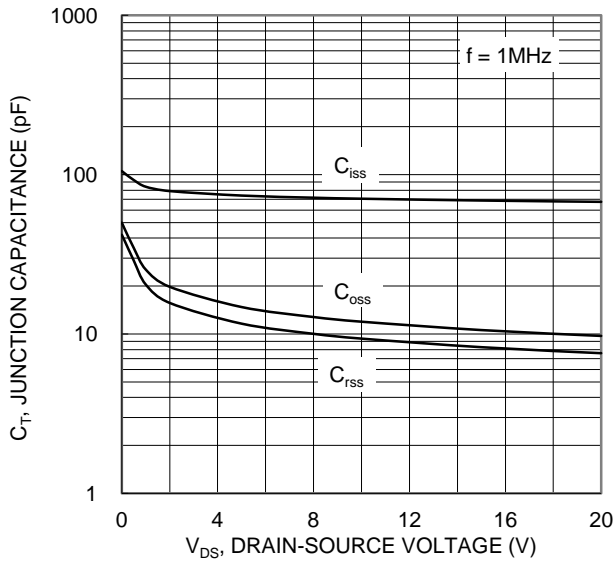


Fig. 13 Typical Junction Capacitance

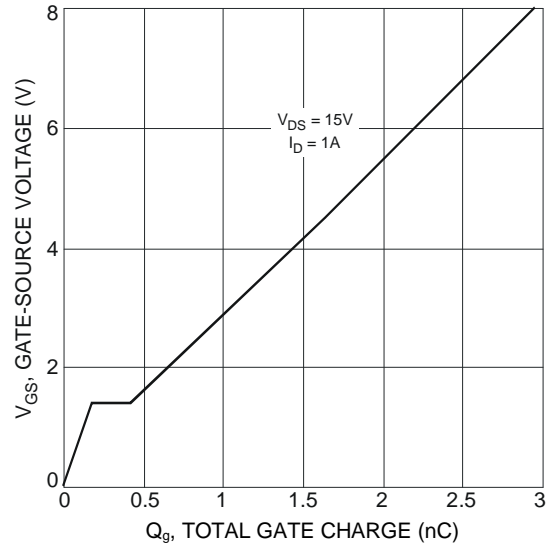
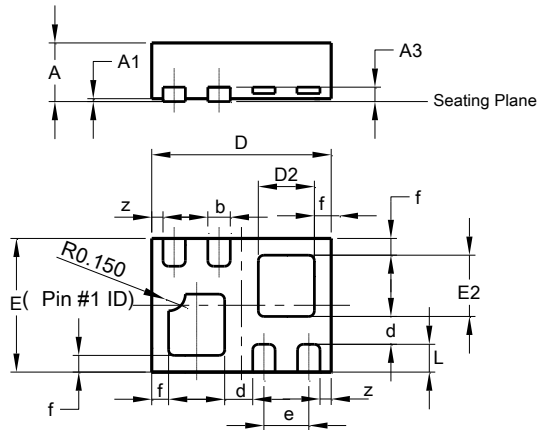


Fig. 14 Gate-Charge Characteristics

Package Outline Dimensions

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

X2-DFN1310-6

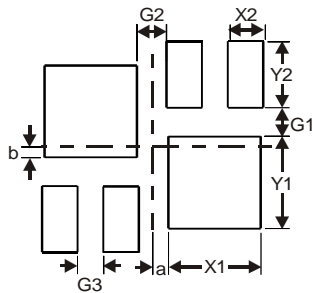


X2-DFN1310-6			
Dim	Min	Max	Typ
A	-	0.40	-
A1	0	0.05	0.02
A3	-	-	0.13
b	0.10	0.20	0.15
D	1.25	1.38	1.30
d	-	-	0.25
D2	0.30	0.50	0.40
E	0.95	1.075	1.00
e	-	-	0.35
E2	0.30	0.50	0.40
f	-	-	0.10
L	0.20	0.30	0.25
Z	-	-	0.05
All Dimensions in mm			

Suggested Pad Layout

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

X2-DFN1310-6



Dimensions	Value (in mm)
G1	0.16
G2	0.17
G3	0.15
X1	0.52
X2	0.20
Y1	0.52
Y2	0.375
a	0.09
b	0.06

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