Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D T_A = +25°C
20V	0.45Ω @ V_{GS} = 4.5V	1.3A
	0.6Ω @ V_{GS} = 2.5V	1.2A

Features and Benefits

- Footprint of Just 0.6mm²—13 Times Smaller Than SOT23
- Low Gate Threshold Voltage
- 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-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative.**
  https://www.diodes.com/quality/product-definitions/

Description and Applications

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

- Portable Electronics

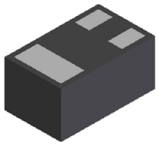
Mechanical Data

- Case: X1-DFN1006-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish—NiPdAu Over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e4
- Weight: 0.001 grams (Approximate)

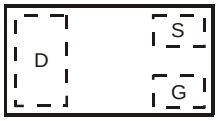


ESD PROTECTED

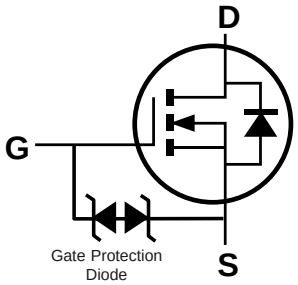
X1-DFN1006-3



Bottom View



Top View
Internal Schematic



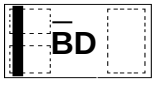
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2710UFB-7	X1-DFN1006-3	3,000/Tape & Reel
DMN2710UFB-7B	X1-DFN1006-3	10,000/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



Top View
Bar Denotes Gate and Source Side

$\overline{BD}$ = Part Marking Code

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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}	±6	V
Continuous Drain Current (Note 6) V_{GS} = 4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	1.3 1.1	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	5	A
Maximum Body Diode Forward Current (Note 6)			I_S	1.3	A

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P_D	0.72	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	174	°C/W
Total Power Dissipation (Note 6)		P_D	1.3	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	96	°C/W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	117	°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}	20	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	100	nA	V_{DS} = 20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±1.0	µA	V_{GS} = ±4.5V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.5	—	1.0	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	0.13	0.45	Ω	V_{GS} = 4.5V, I_D = 600mA
		—	0.17	0.6		V_{GS} = 2.5V, I_D = 500mA
		—	0.25	0.75		V_{GS} = 1.8V, I_D = 350mA
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 150mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	42	—	pF	V_{DS} = 16V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	13	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	6.5	—	pF	
Total Gate Charge	Q_g	—	0.6	—	nC	V_{GS} = 4.5V, V_{DS} = 10V, I_D = 250mA
Gate-Source Charge	Q_{gs}	—	0.1	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	14	—	ns	V_{DD} = 10V, V_{GS} = 4.5V, R_L = 47Ω, R_g = 10Ω I_D = 200mA
Turn-On Rise Time	t_R	—	19	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	57	—	ns	
Turn-Off Fall Time	t_F	—	65	—	ns	
Reverse Recovery Time	t_{RR}	—	88	—	ns	I_F = 1A, di/dt = 100A/µs
Reverse Recovery Charge	Q_{RR}	—	29	—	nC	I_F = 1A, di/dt = 100A/µs

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

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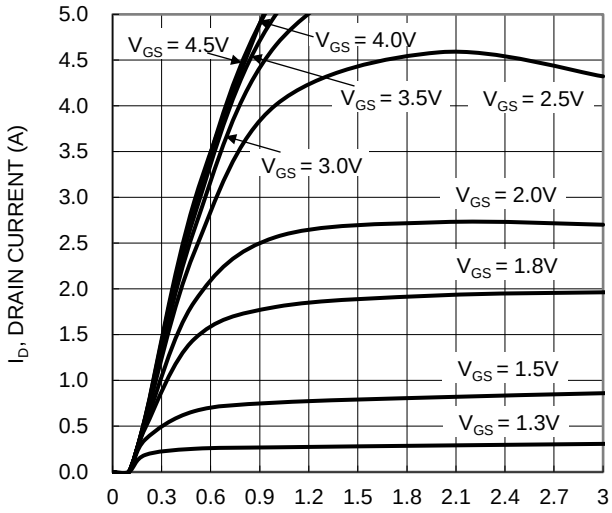


Figure 1. Typical Output Characteristic

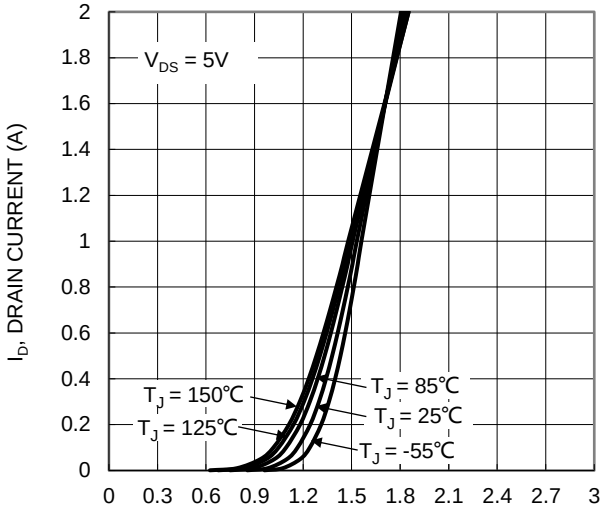


Figure 2. Typical Transfer Characteristic

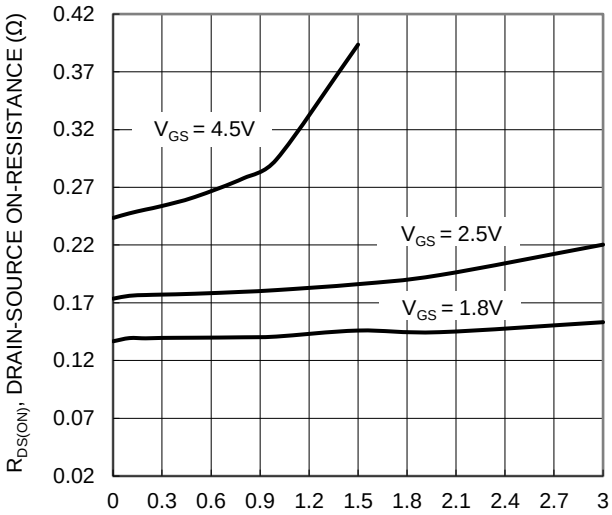


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

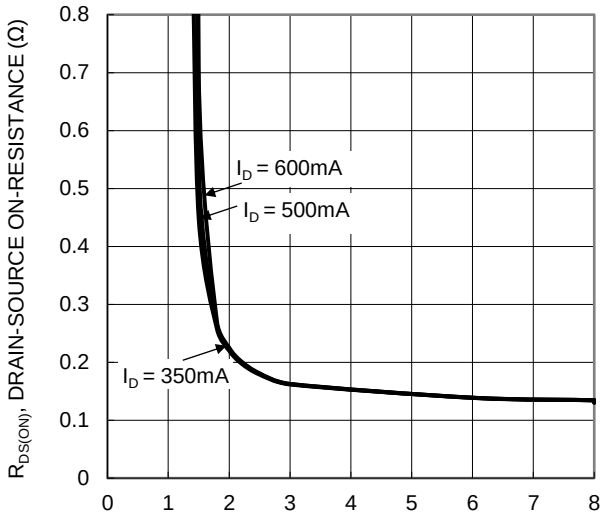


Figure 4. Typical Transfer Characteristic

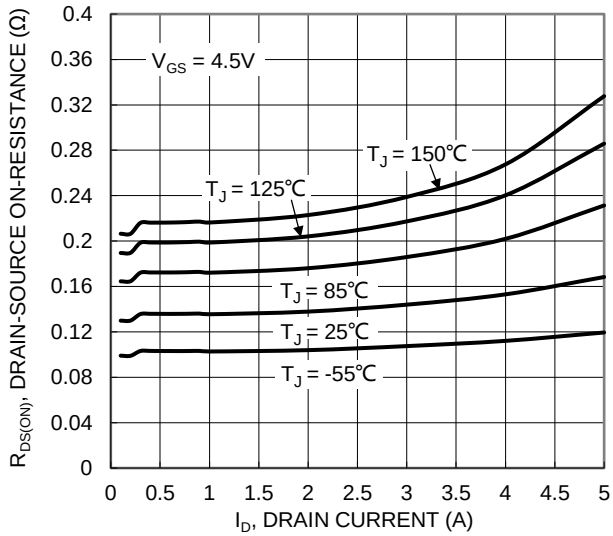


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

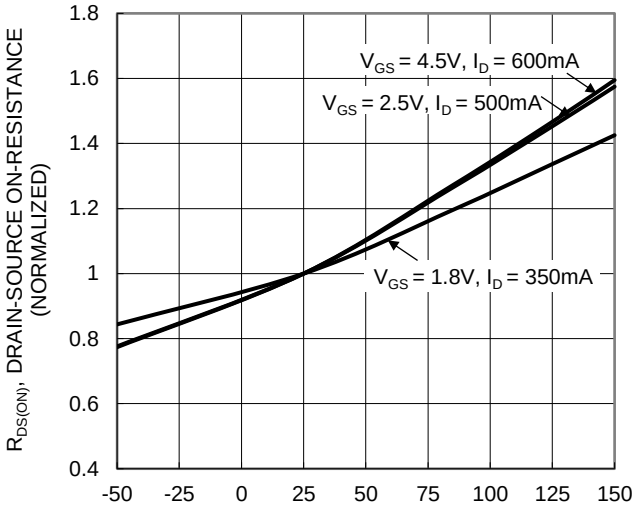


Figure 6. On-Resistance Variation with Temperature

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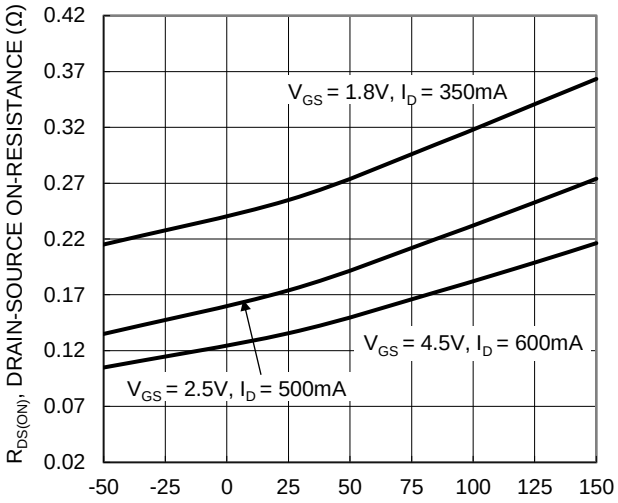


Figure 7. On-Resistance Variation with Temperature

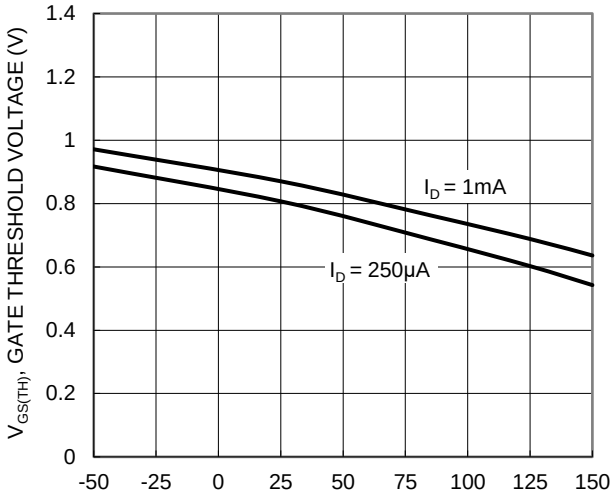


Figure 8. Gate Threshold Variation vs. Junction Temperature

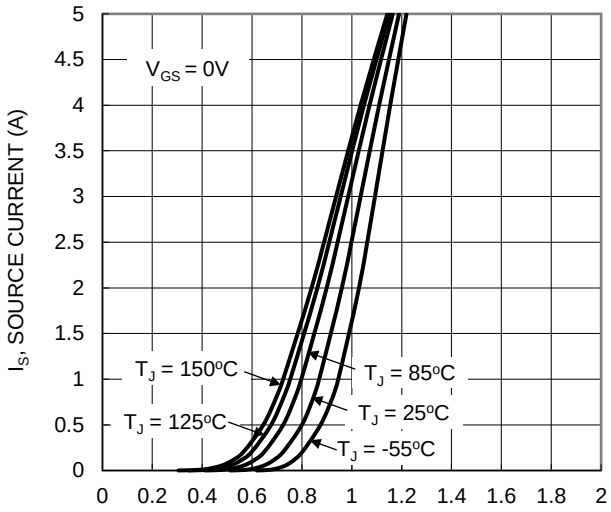


Figure 9. Diode Forward Voltage vs. Current

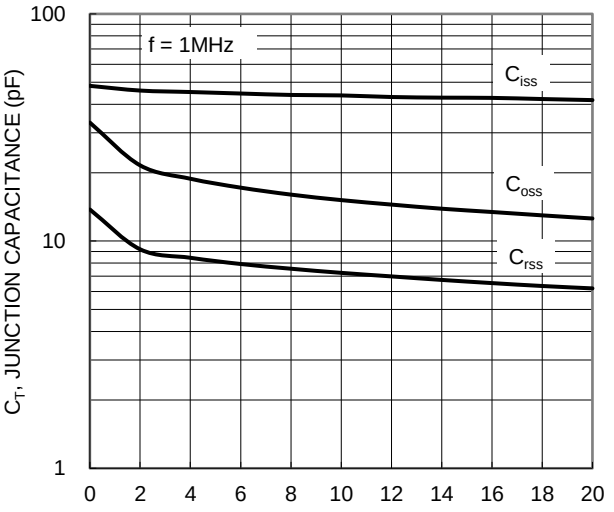


Figure 10. Typical Junction Capacitance

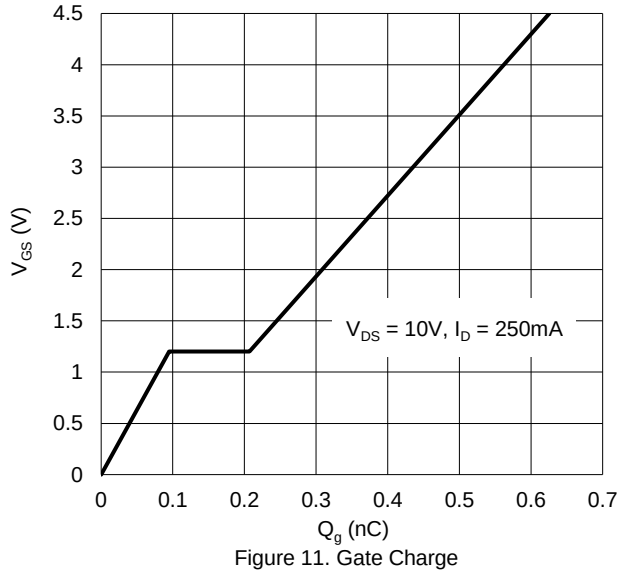


Figure 11. Gate Charge

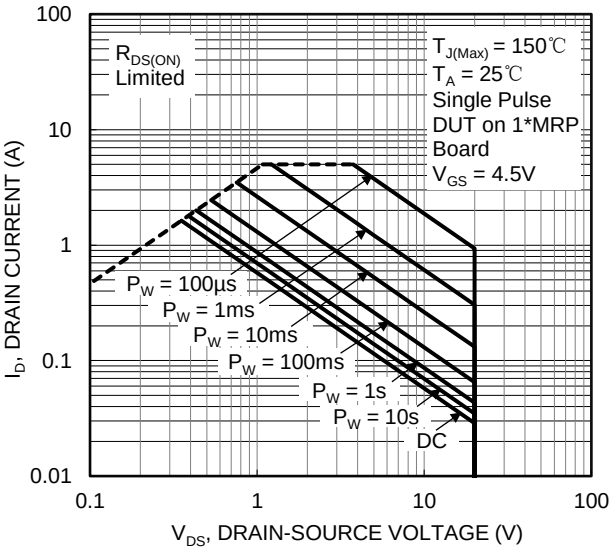


Figure 12. SOA, Safe Operation Area

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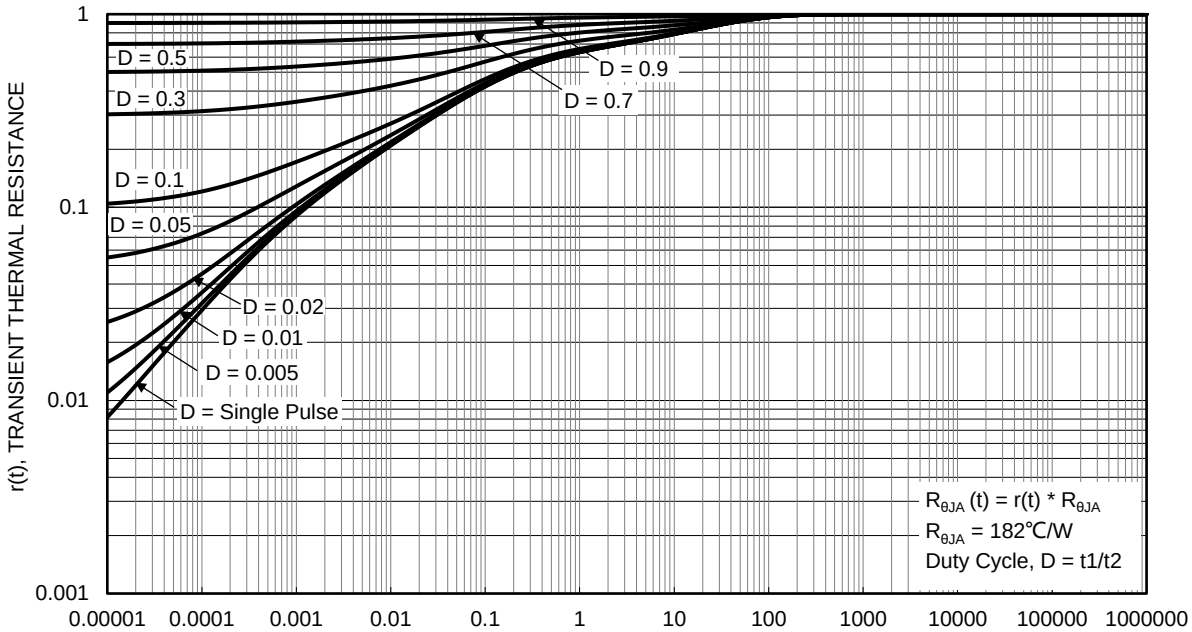


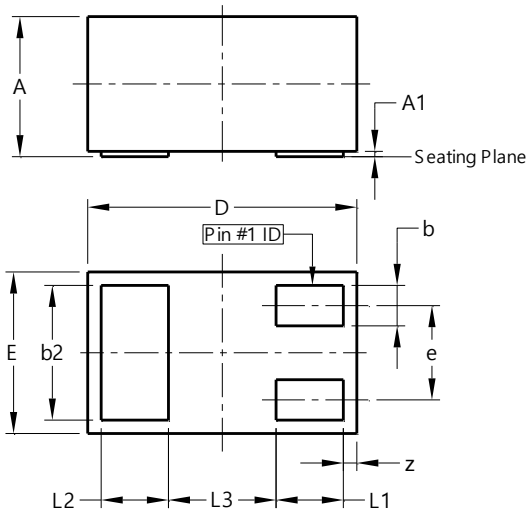
Figure 13. Transient Thermal Resistance

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Package Outline Dimensions

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

X1-DFN1006-3

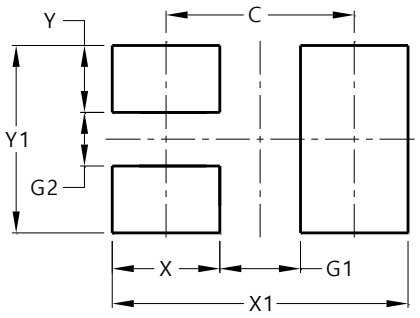


X1-DFN1006-3			
Dim	**Min**	**Max**	**Typ**
A	0.47	0.53	0.50
A1	0.00	0.05	0.03
b	0.10	0.20	0.15
b2	0.45	0.55	0.50
D	0.95	1.075	1.00
E	0.55	0.675	0.60
e	-	-	0.35
L1	0.20	0.30	0.25
L2	0.20	0.30	0.25
L3	-	-	0.40
z	0.02	0.08	0.05
All Dimensions in mm			

Suggested Pad Layout

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

X1-DFN1006-3



Dimensions	Value (in mm)
C	0.70
G1	0.30
G2	0.20
X	0.40
X1	1.10
Y	0.25
Y1	0.70

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