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Diodes Incorporated
DMP21D0UFB4-7B

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A Product Line of
Diodes Incorporated

DMP21D0UFB4

20V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D @ T_A = 25°C
-20V	495mΩ @ V_{GS} = -4.5V	-0.77A
	690mΩ @ V_{GS} = -2.5V	-0.67A
	960mΩ @ V_{GS} = -1.8V	-0.57A

Features and Benefits

- Footprint of just 0.6mm^2 – thirteen times smaller than SOT23
- 0.4mm profile – ideal for low profile applications
- Low Gate Threshold Voltage
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **ESD Protected Gate 3KV**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description and Applications

This MOSFET has been 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.

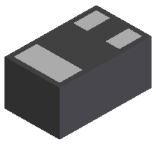
- Portable electronics

Mechanical Data

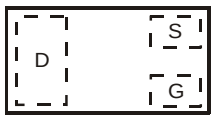
- Case: X2-DFN1006-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.001 grams (approximate)

ESD PROTECTED TO 3kV

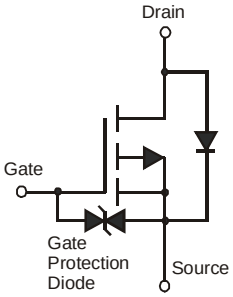
X2-DFN1006-3



Bottom View



Top View
Internal Schematic



Equivalent Circuit

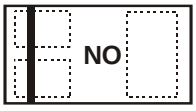
Ordering Information (Note 3)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMP21D0UFB4-7B	NO	7	8	10,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
3. For packaging details, go to our website at http://www.diodes.com.

Marking Information

DMP21D0UFB4-7B



Top View
Bar Denotes Gate
and Source Side

NO = 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	Steady State	T_A = 25°C (Note 4) T_A = 85°C (Note 4) T_A = 25°C (Note 5)	I_D	-0.77 -0.55 -1.17	A
Pulsed Drain Current (Note 6)			I_{DM}	-5.0	A

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 4)	P_D	0.43	W
Power Dissipation (Note 5)	P_D	0.99	W
Thermal Resistance, Junction to Ambient (Note 4)	$R_{\theta JA}$	293	°C/W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	126	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Thermal Characteristics

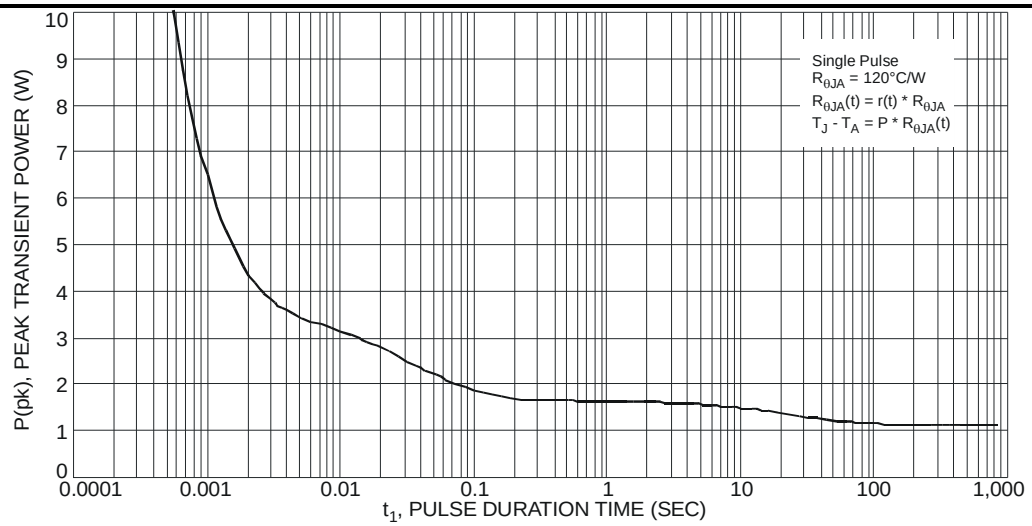


Fig. 1 Single Pulse Maximum Power Dissipation

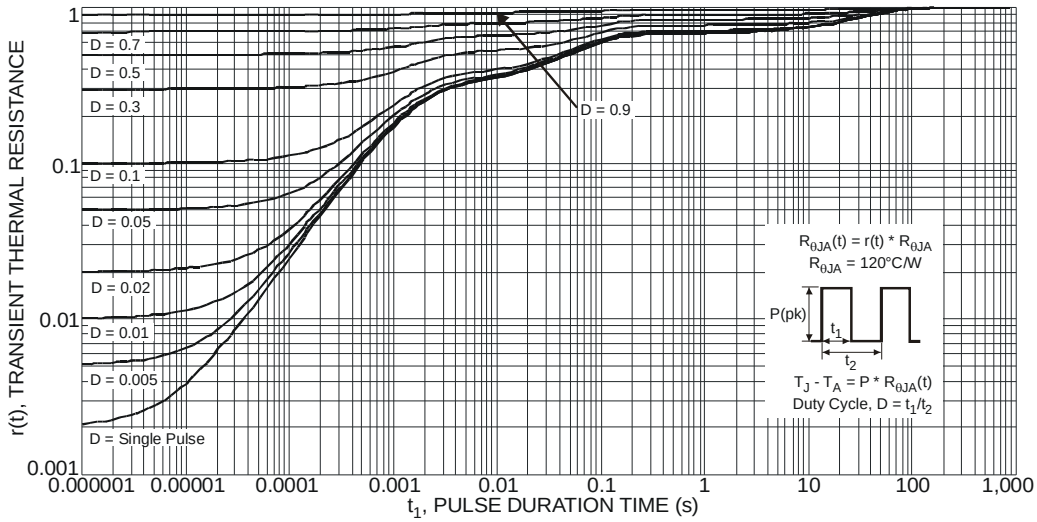


Fig. 2 Transient Thermal Response

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}	-	-	-1	µA	V_{DS} = -20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±10	µA	V_{GS} = ±8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	-	-0.7	-	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	-	-	495	mΩ	V_{GS} = -4.5V, I_D = -400mA
				690		V_{GS} = -2.5V, I_D = -300mA
				960		V_{GS} = -1.8V, I_D = -100mA
Forward Transfer Admittance	$\|Y_{fs}\|$	50	-	-	mS	V_{DS} = -3V, I_D = -300mA
Diode Forward Voltage	V_{SD}	-	-	-1.2	V	V_{GS} = 0V, I_S = -300mA
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{iss}	-	76.5	-	pF	V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	13.7	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	10.7	-	pF	
Gate Resistance	R_g	-	195	-	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g		1.5	-	nC	V_{GS} = -8V, V_{DS} = -15V, I_D = -1A
Total Gate Charge	Q_g	-	1.0	-	nC	V_{GS} = -4.5V, V_{DS} = -15V, I_D = -1A
Gate-Source Charge	Q_{gs}	-	0.2	-	nC	
Gate-Drain Charge	Q_{gd}	-	0.3	-	nC	
Turn-On Delay Time	$t_{D(on)}$	-	7.1	-	ns	V_{DS} = -10V, -I_D = 1A V_{GS} = -4.5V, R_G = 6Ω
Turn-On Rise Time	t_r	-	8.0	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	31.7	-	ns	
Turn-Off Fall Time	t_f	-	18.5	-	ns	

Notes:
4. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout
5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate
6. Device mounted on minimum recommended pad layout test board, 10µs pulse duty cycle = 1%.
7. Short duration pulse test used to minimize self-heating effect.

Typical Characteristics

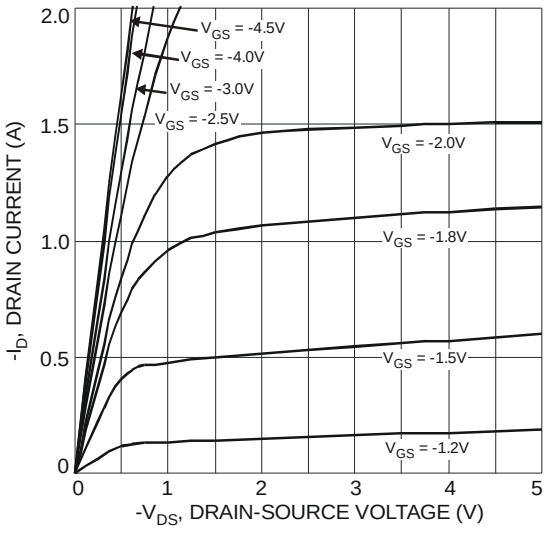


Fig. 3 Typical Output Characteristic

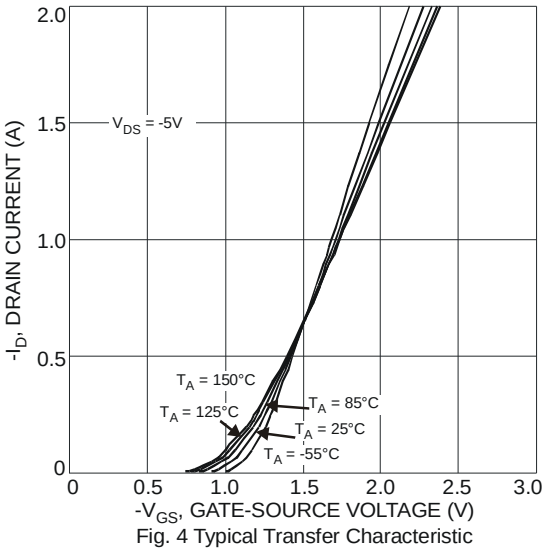


Fig. 4 Typical Transfer Characteristic

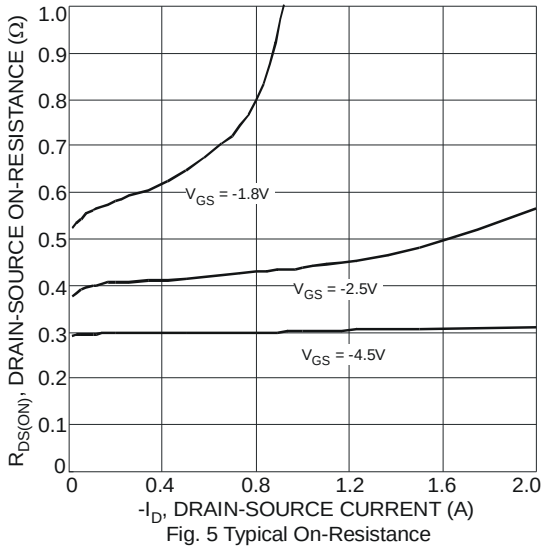


Fig. 5 Typical On-Resistance
vs. Drain Current and Gate Voltage

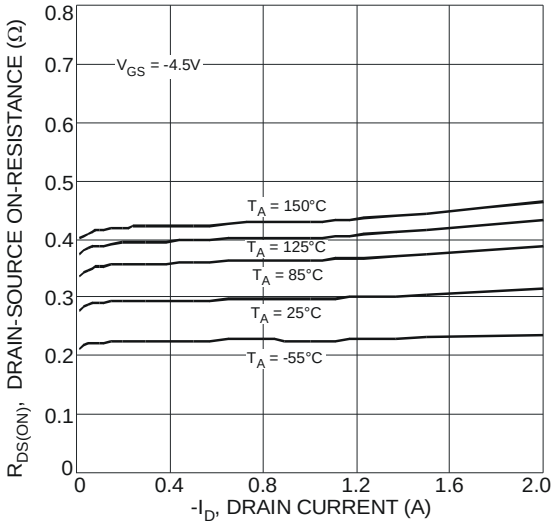


Fig. 6 Typical On-Resistance
vs. Drain Current and Temperature

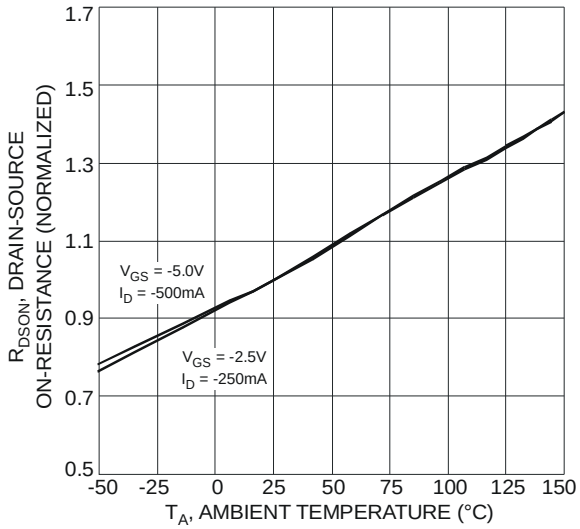


Fig. 7 On-Resistance Variation with Temperature

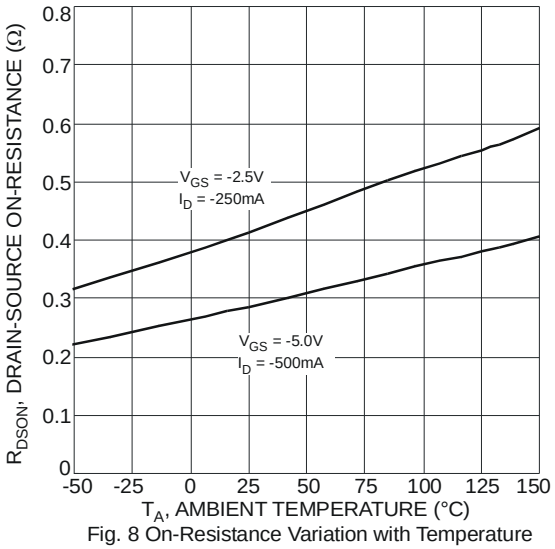


Fig. 8 On-Resistance Variation with Temperature

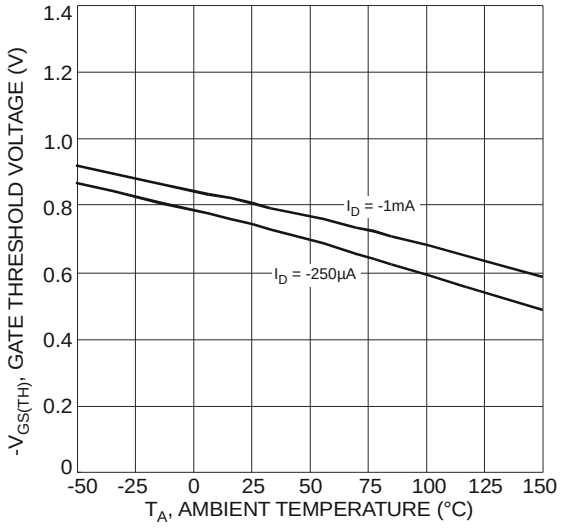


Fig. 9 Gate Threshold Variation vs. Ambient Temperature

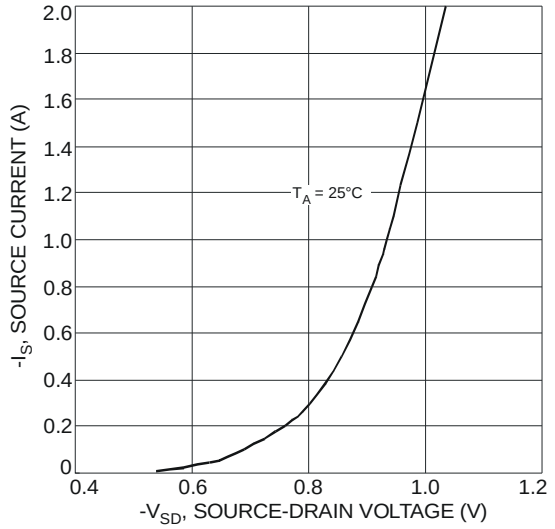


Fig. 10 Diode Forward Voltage vs. Current

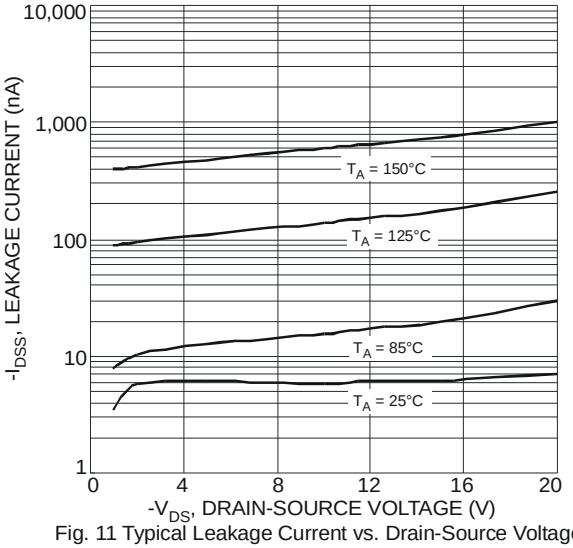


Fig. 11 Typical Leakage Current vs. Drain-Source Voltage

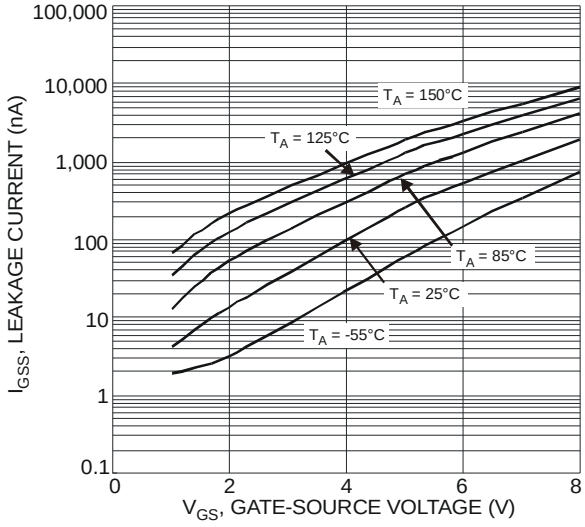


Fig.12 Leakage Current vs. Gate-Source Voltage

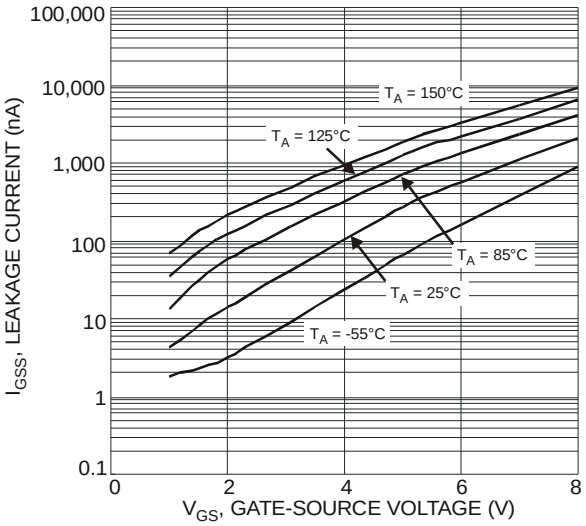


Fig.13 Leakage Current vs. Gate-Source Voltage

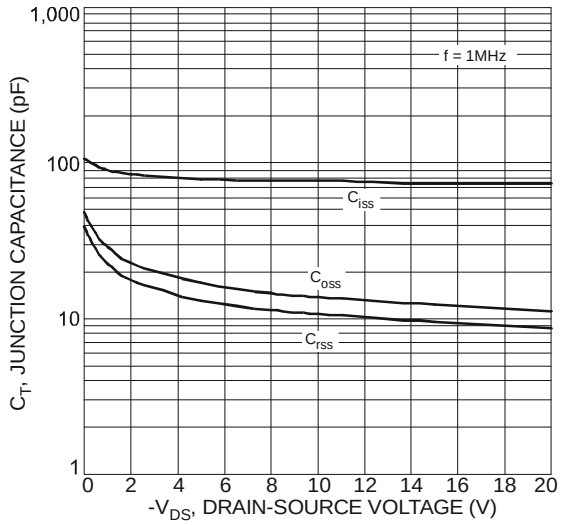


Fig. 14 Typical Junction Capacitance

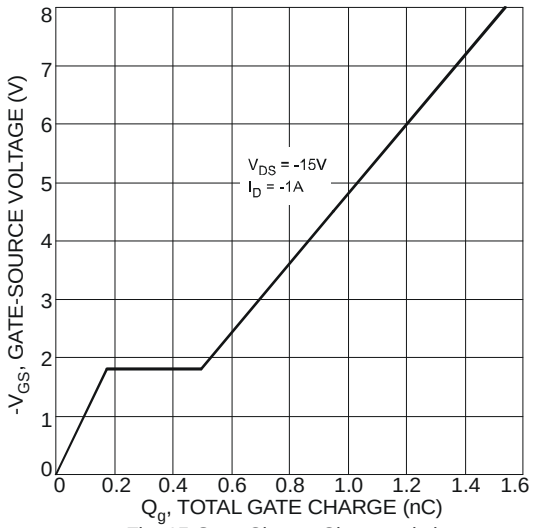


Fig. 15 Gate-Charge Characteristics

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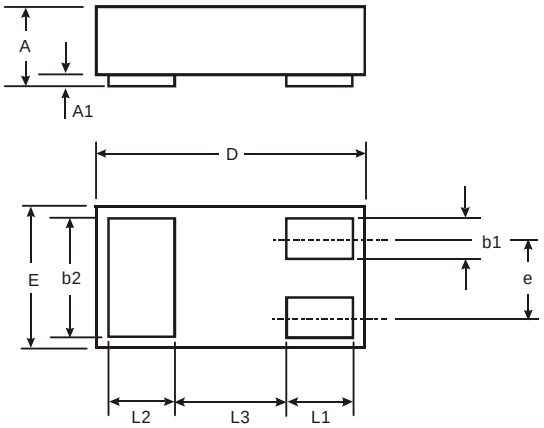
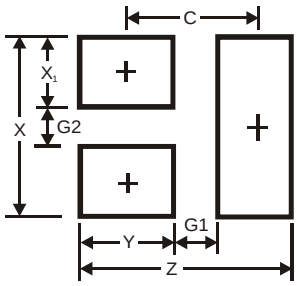
Package Outline Dimensions



X2-DFN1006-3			
Dim	**Min**	**Max**	**Typ**
A	—	0.40	—
A1	0	0.05	0.03
b1	0.10	0.20	0.15
b2	0.45	0.55	0.50
D	0.95	1.05	1.00
E	0.55	0.65	0.60
e	—	—	0.35
L1	0.20	0.30	0.25
L2	0.20	0.30	0.25
L3	—	—	0.40
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	1.1
G1	0.3
G2	0.2
X	0.7
X1	0.25
Y	0.4
C	0.7

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