

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>A</sub> = +25°C
-20V	1.9Ω @ V <sub>GS</sub> = -4.5V	-530mA
	2.4Ω @ V <sub>GS</sub> = -2.5V	-471mA
	3.4Ω @ V <sub>GS</sub> = -1.8V	-397mA
	5.0Ω @ V <sub>GS</sub> = -1.5V	-328mA

## Description

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.

## Applications

- General Purpose Interfacing Switch
- Power Management Functions
- Analog Switch

## Features and Benefits

- Low Package Profile
- 0.6mm x 0.4mm Package Footprint
- Low On-Resistance
- Very Low Gate Threshold Voltage: -1.0V Max
- **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**

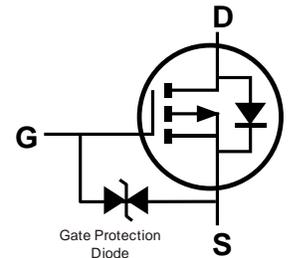
## Mechanical Data

- Case: X2-DFN0604-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 <sup>(e3)</sup>
- Weight: 0.001 grams (Approximate)

X2-DFN0604-3



Top View  
Package Pin Configuration



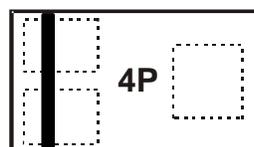
Equivalent Circuit

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP22D4UFO-7B	X2-DFN0604-3	10,000/Tape & Reel

- 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



Top View  
Bar Denotes Gate  
and Source Side

4P = 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>	-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	I <sub>D</sub>	-530	mA
		T <sub>A</sub> = +85°C		-383	
Pulsed Drain Current (Note 6)			I <sub>DM</sub>	-0.6	mA

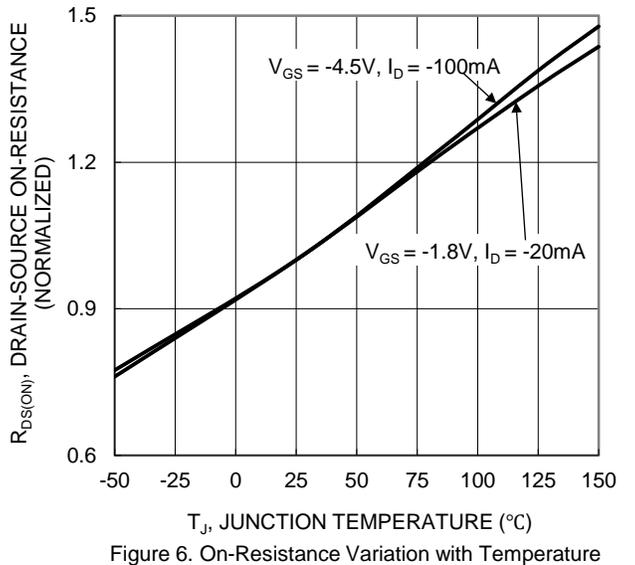
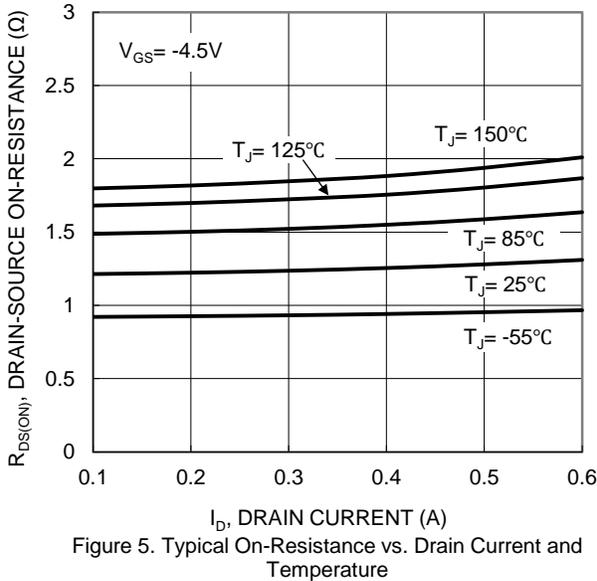
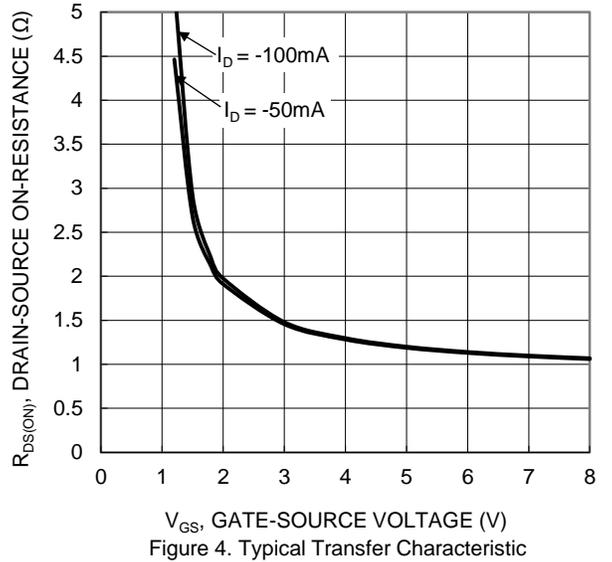
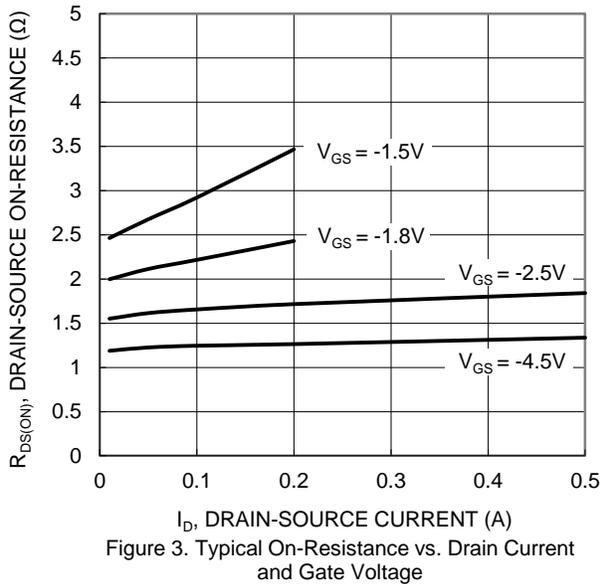
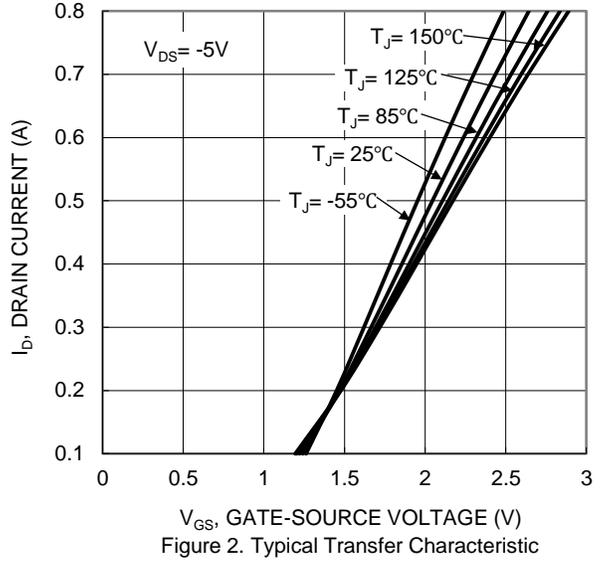
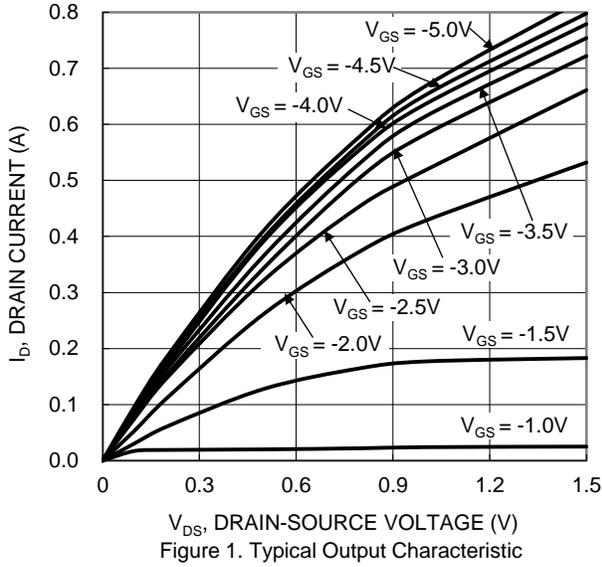
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	Steady State	P <sub>D</sub>	820	mW
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	155	°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</b> (Note 7)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
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</b> (Note 7)						
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>	—	—	1.9	Ω	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -100mA
		—	—	2.4		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -50mA
		—	—	3.4		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -20mA
		—	—	5.0		V <sub>GS</sub> = -1.5V, I <sub>D</sub> = -10mA
Diode Forward Voltage	V <sub>SD</sub>	—	-0.6	-1.1	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -10mA
<b>DYNAMIC CHARACTERISTICS</b> (Note 8)						
Input Capacitance	C <sub>ISS</sub>	—	28.7	—	pF	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>OSS</sub>	—	4.2	—	pF	
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	2.9	—	pF	
Gate Resistance	R <sub>G</sub>	—	399	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge	Q <sub>G</sub>	—	0.4	—	nC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -250mA
Gate-Source Charge	Q <sub>GS</sub>	—	0.08	—	nC	
Gate-Drain Charge	Q <sub>GD</sub>	—	0.06	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	5.8	—	ns	V <sub>DD</sub> = -15V, V <sub>GS</sub> = -4.5V, R <sub>G</sub> = 2Ω, I <sub>D</sub> = -200mA
Turn-On Rise Time	t <sub>R</sub>	—	5.7	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	31.1	—	ns	
Turn-Off Fall Time	t <sub>F</sub>	—	16.4	—	ns	

- Notes:
5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
  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.
  8. Guaranteed by design. Not subject to product testing.



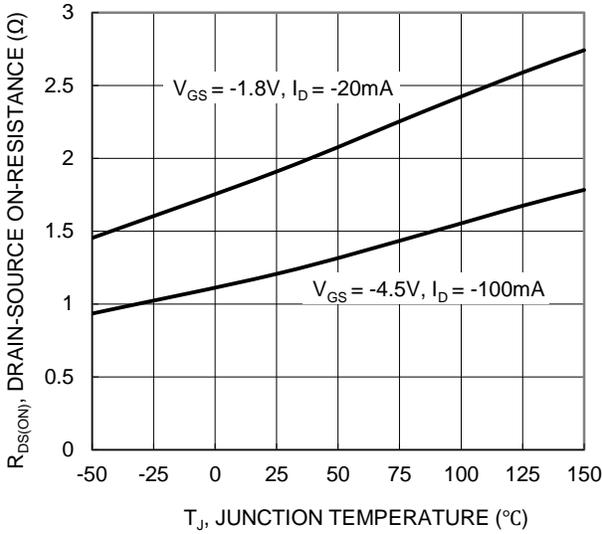


Figure 7. On-Resistance Variation with Temperature

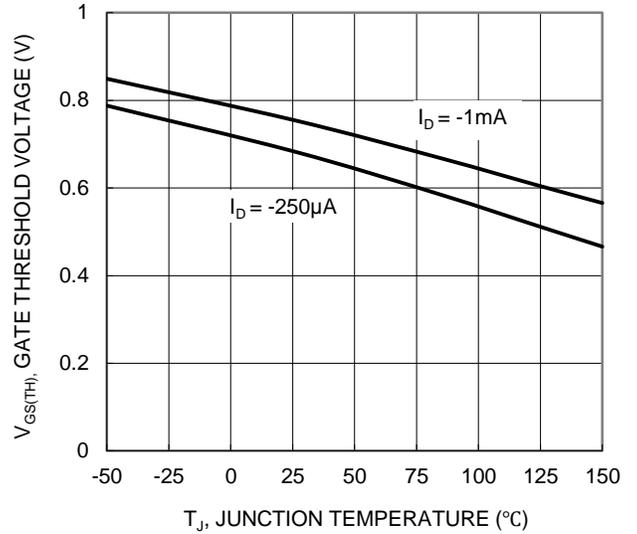


Figure 8. Gate Threshold Variation vs. Junction Temperature

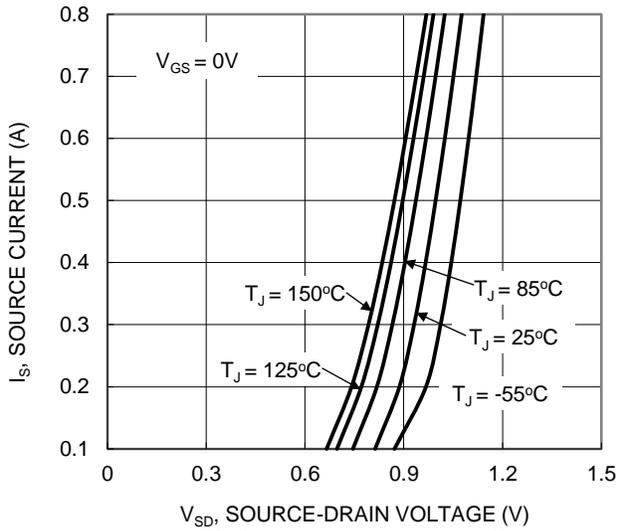


Figure 9. Diode Forward Voltage vs. Current

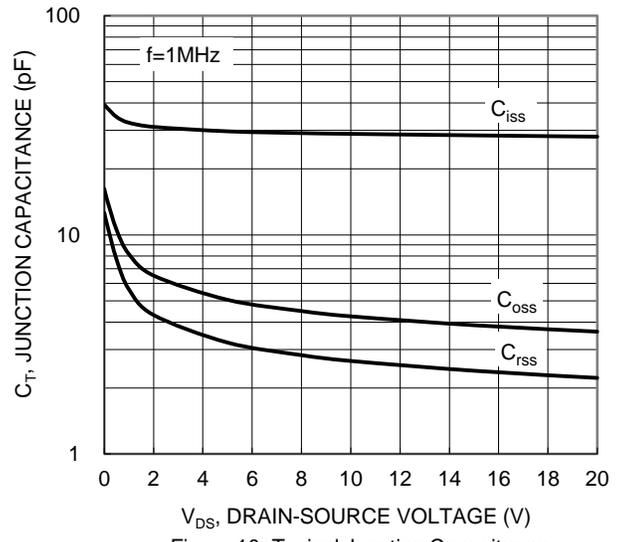


Figure 10. Typical Junction Capacitance

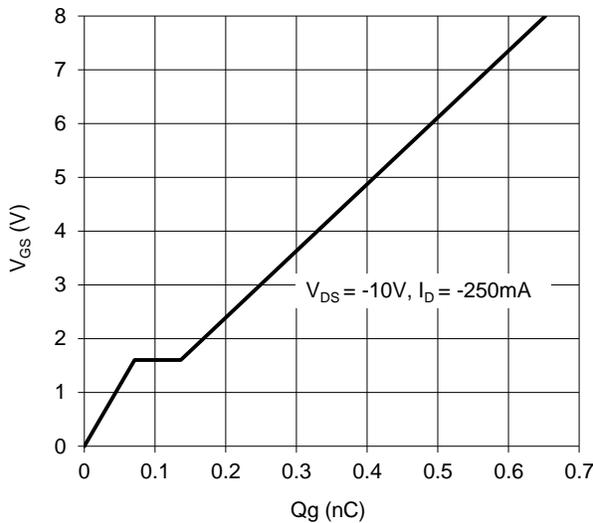


Figure 11. Gate Charge

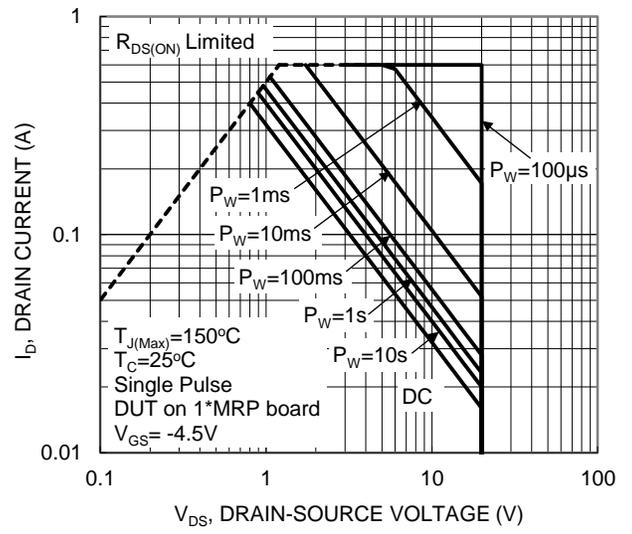


Figure 12. SOA, Safe Operation Area

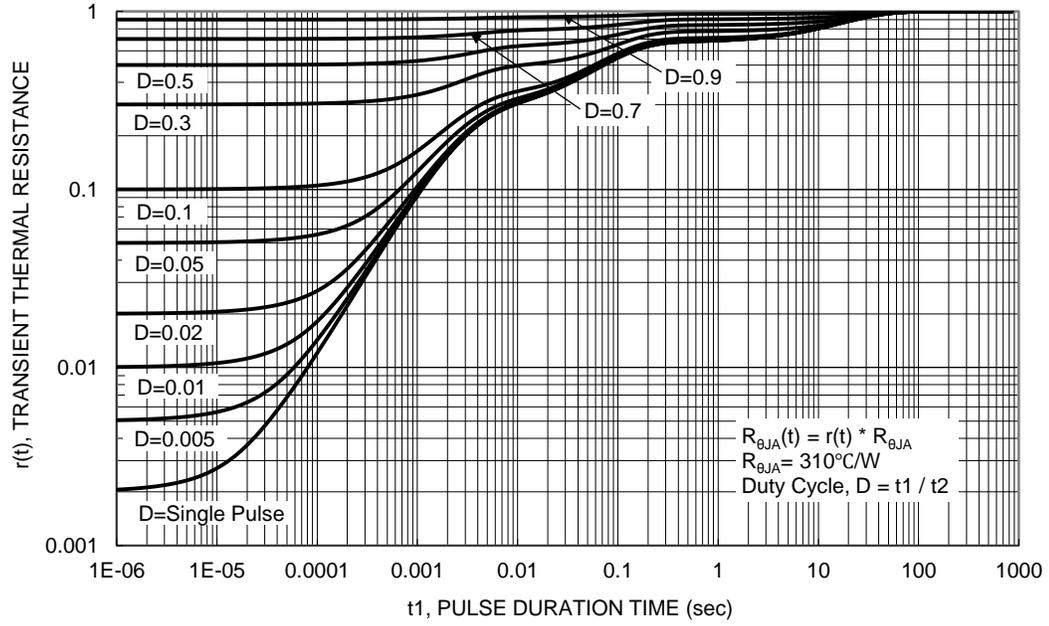
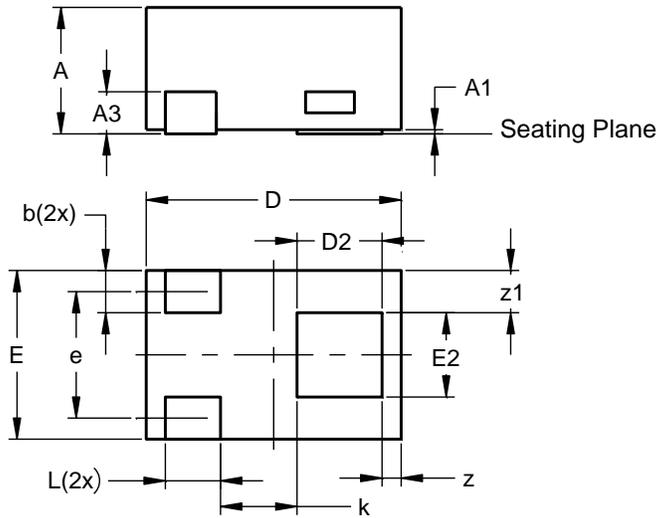


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

**X2-DFN0604-3**

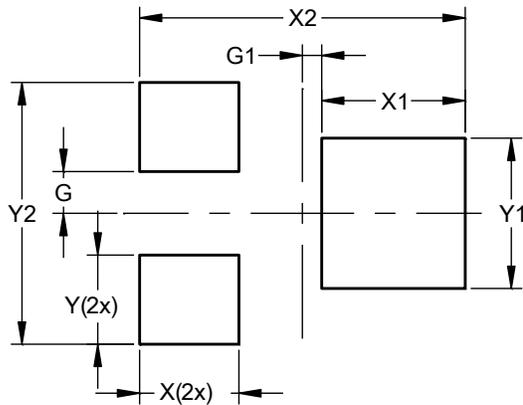


X2-DFN0604-3			
Dim	Min	Max	Typ
A	--	0.40	0.36
A1	0.00	0.03	0.02
A3	--	--	0.10
b	0.07	0.15	0.10
D	0.55	0.65	0.60
D2	0.15	0.25	0.20
E	0.35	0.45	0.40
E2	0.15	0.25	0.20
e	--	--	0.30
k	0.15	--	--
L	0.10	0.18	0.13
z	--	--	0.045
z1	--	--	0.10
All Dimensions in mm			

## Suggested Pad Layout

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

**X2-DFN0604-3**



Dimensions	Value (in mm)
G	0.075
G1	0.035
X	0.180
X1	0.260
X2	0.590
Y	0.160
Y1	0.270
Y2	0.470

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