

Product Summary

BV _{DSS}	R _{DS(ON)} max	I _D max T _A = +25°C
30V	1.5Ω @ V _{GS} = 4.5V	0.41A
	2.0Ω @ V _{GS} = 2.5V	0.35A
	3.0Ω @ V _{GS} = 1.8V	0.29A
	4.5Ω @ V _{GS} = 1.5V	0.23A

Features and Benefits

- Low Package Profile
- 0.6mm × 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)**
- 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](https://www.diodes.com/contact-us) or your local Diodes representative.
<https://www.diodes.com/quality/product-definitions/>

Description and Applications

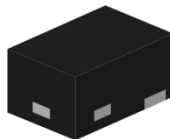
This MOSFET has been designed to minimize the on-state resistance (R_{DS(ON)}) yet maintain superior switching performance, making it ideal for high efficiency power management applications.

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

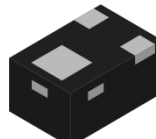
Mechanical Data

- 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 — NiPdAu over Copper Leadframe; Solderable per MIL-STD-202, Method 208④
- Weight: 0.001 grams (Approximate)

X2-DFN0604-3



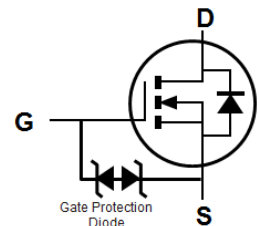
Top View



Bottom View



Top View
Package Pin Configuration



Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN31D5UFO-7B	X2-DFN0604-3	10k/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

DC = Product Type Marking Code

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	30	V
Gate-Source Voltage			V _{GSS}	±12	V
Continuous Drain Current (Note 5) V _{GS} = 4.5V	Steady State	T _A = +25°C	I _D	0.41	A
		T _A = +85°C		0.32	
Pulsed Drain Current (Note 6)			I _{DM}	0.7	A

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	Steady State	P _D	0.38	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	332	°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}	30	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	100	μA	V _{DS} = 24V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	μA	V _{GS} = ±10V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	0.4	—	1.0	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	1.2	1.5	Ω	V _{GS} = 4.5V, I _D = 100mA
		—	1.4	2.0		V _{GS} = 2.5V, I _D = 50mA
		—	1.6	3.0		V _{GS} = 1.8V, I _D = 20mA
		—	1.8	4.5		V _{GS} = 1.5V, I _D = 10mA
Diode Forward Voltage	V _{SD}	—	0.6	1.0	V	V _{GS} = 0V, I _S = 10mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	22.6	—	pF	V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	2.68	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	1.8	—	pF	
Total Gate Charge	Q _g	—	0.38	—	nC	V _{GS} = 4.5V, V _{DS} = 15V, I _D = 200mA
Gate-Source Charge	Q _{gs}	—	0.05	—	nC	
Gate-Drain Charge	Q _{gd}	—	0.07	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	3.2	—	ns	V _{DD} = 15V, V _{GS} = 4.5V, R _G = 2Ω, I _D = 200mA
Turn-On Rise Time	t _R	—	2.2	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	21	—	ns	
Turn-Off Fall Time	t _F	—	7.5	—	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.

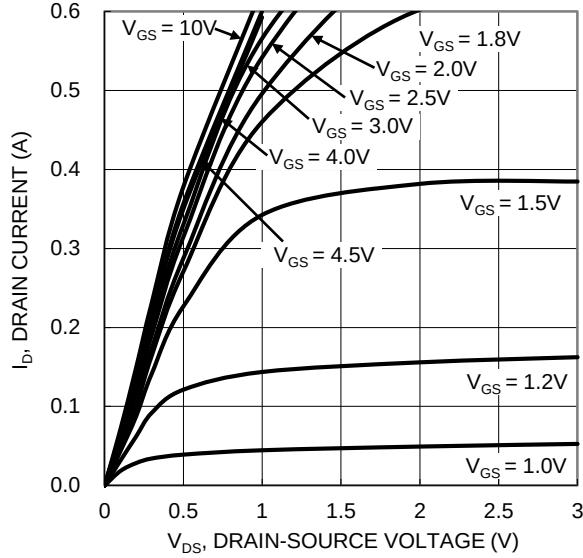


Figure 1. Typical Output Characteristic

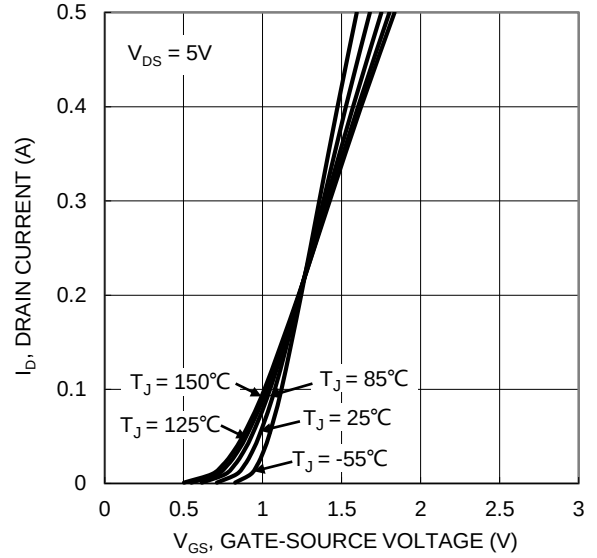


Figure 2. Typical Transfer Characteristic

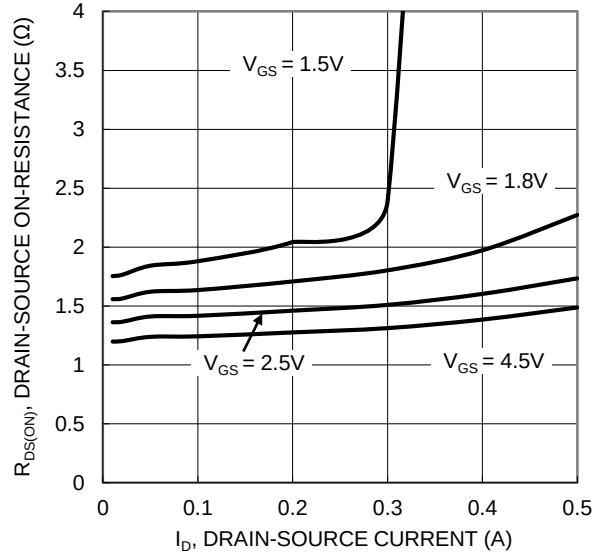


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

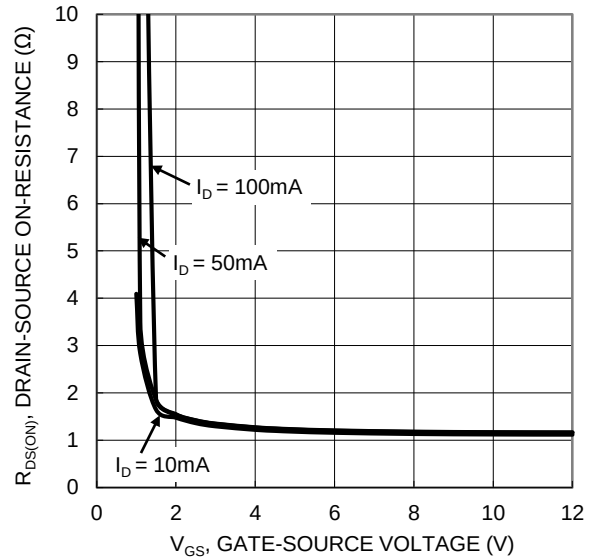


Figure 4. Typical Transfer Characteristic

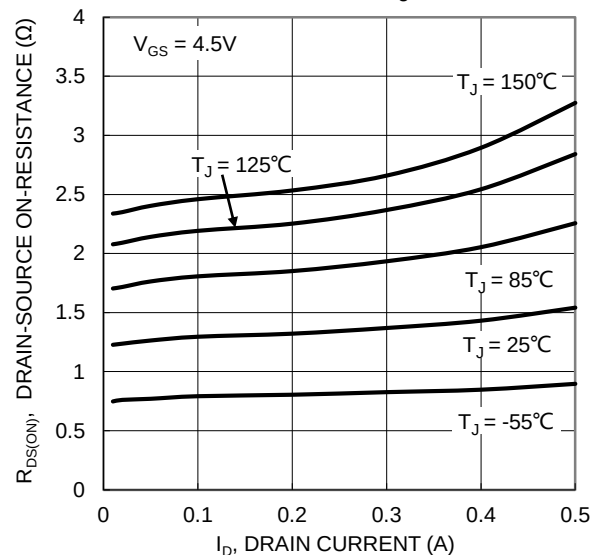


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

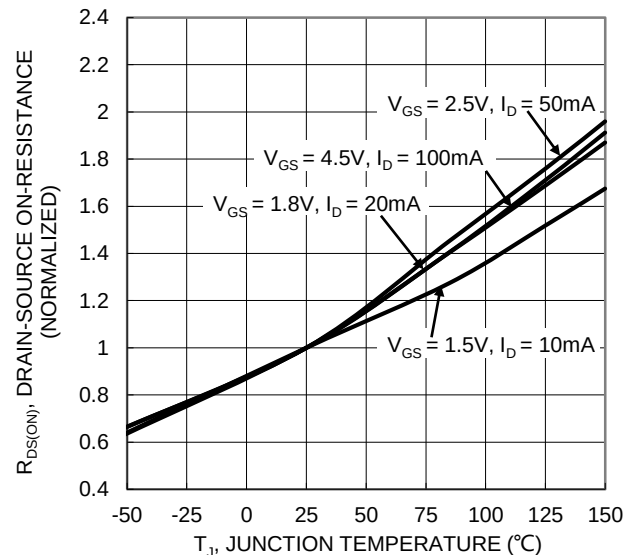


Figure 6. On-Resistance Variation with Junction Temperature

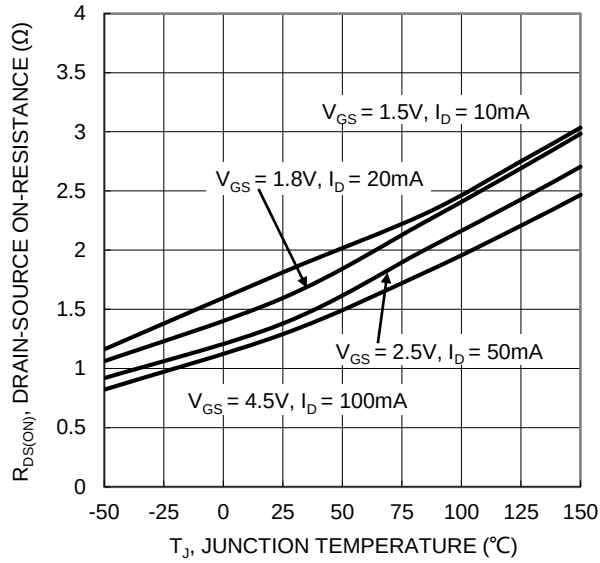


Figure 7. On-Resistance Variation with Junction Temperature

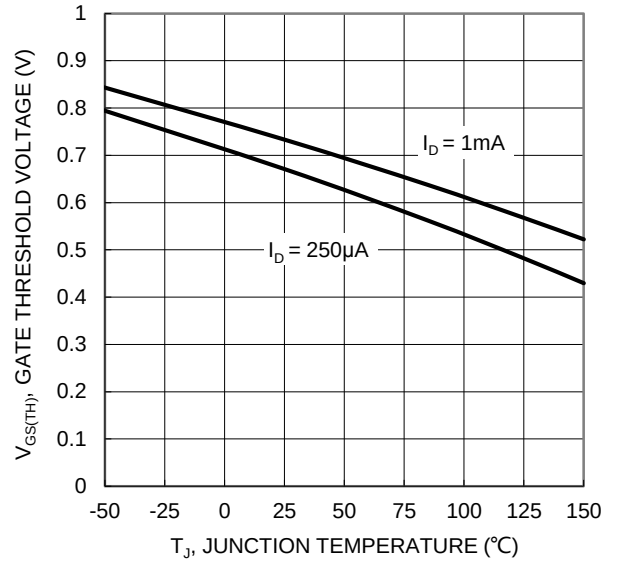


Figure 8. Gate Threshold Variation vs. Junction Temperature

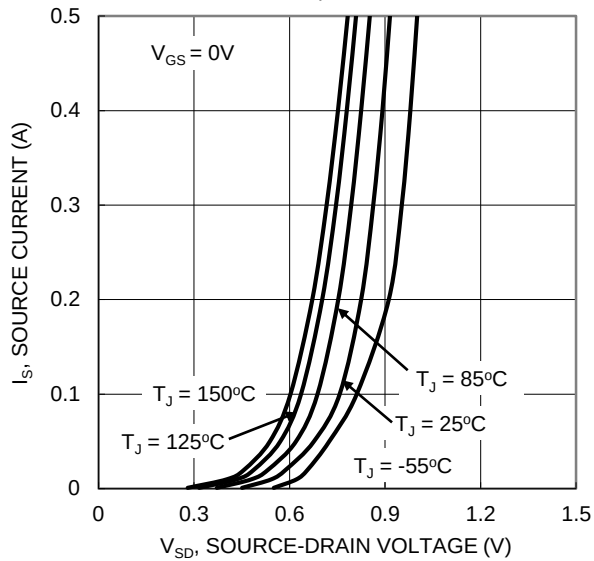


Figure 9. Diode Forward Voltage vs. Current

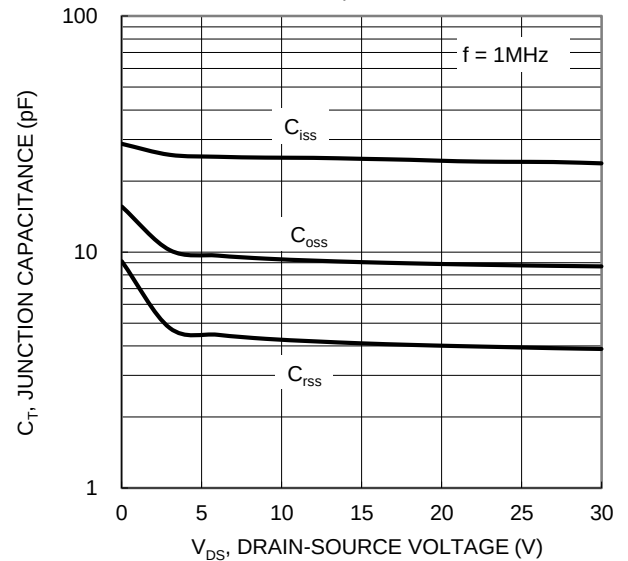


Figure 10. Typical Junction Capacitance

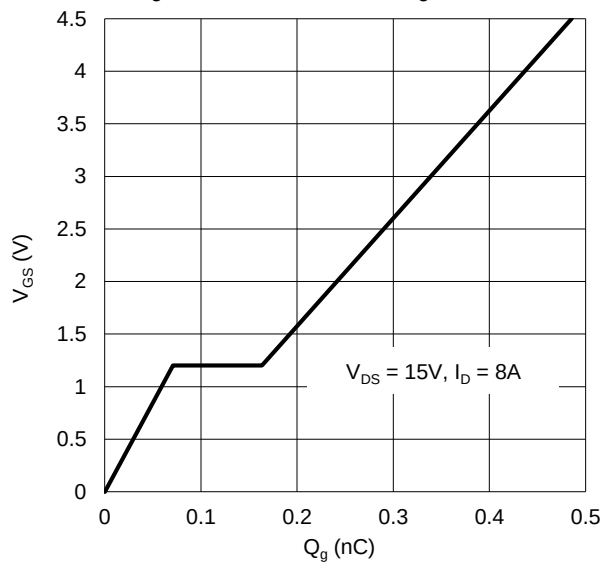


Figure 11. Gate Charge

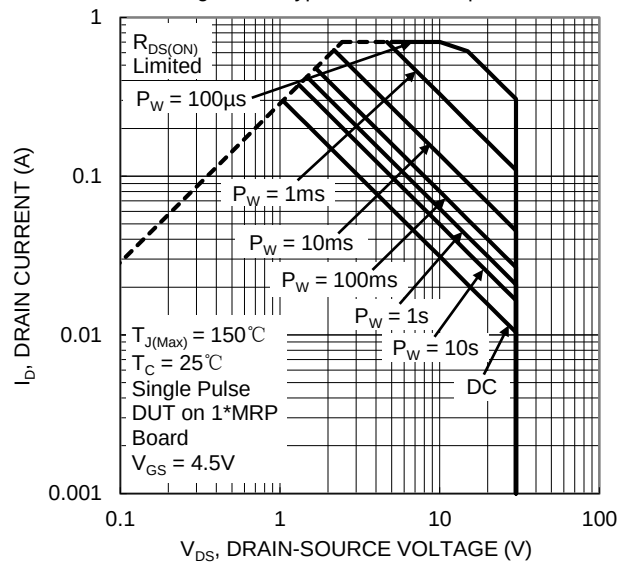


Figure 12. SOA, Safe Operation Area

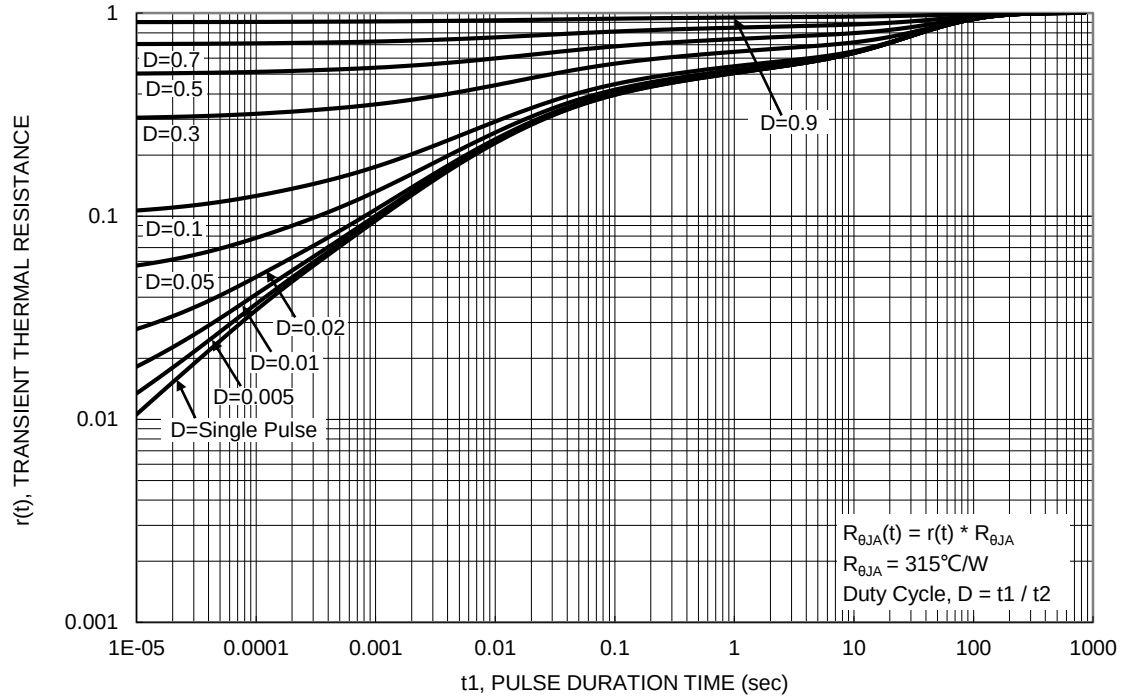
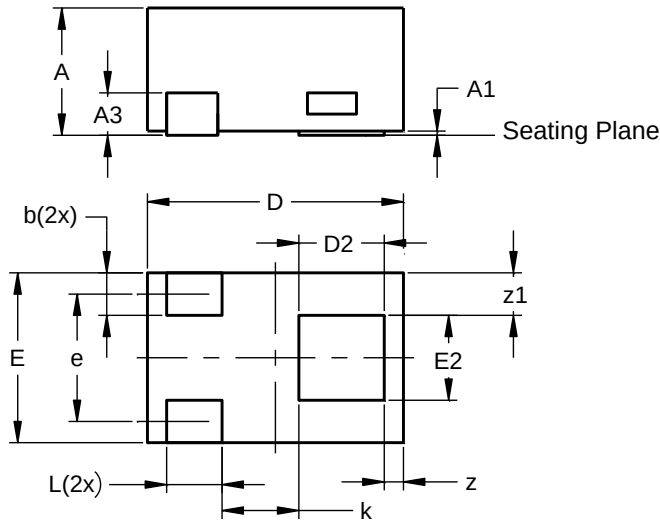


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

X2-DFN0604-3

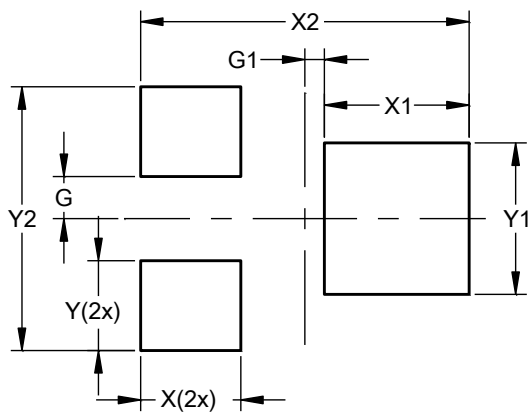


X2-DFN0604-3			
Dim	Min	Max	Typ
A	--	0.40	0.36
A1	0.00	0.03	0.02
A3	--	--	0.10
b	0.07	0.15	0.10
D	0.55	0.65	0.60
D2	0.15	0.25	0.20
E	0.35	0.45	0.40
E2	0.15	0.25	0.20
e	--	--	0.30
k	0.15	--	--
L	0.10	0.18	0.13
z	--	--	0.045
z1	--	--	0.10
All Dimensions in mm			

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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