

DUAL N-CANNEL ENHANCEMENT MODE MOSFET
Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ max}$	$I_D \text{ max}$ $T_A = +25^\circ\text{C}$
20V	9.5mΩ @ $V_{GS} = 4.5\text{V}$	12.2 A
	13mΩ @ $V_{GS} = 2.5\text{V}$	10.4 A

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.

- General Purpose Interfacing Switch
- Power Management Functions

Features and Benefits

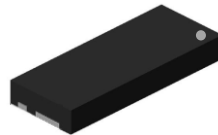
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

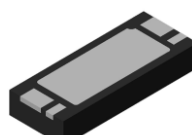
- Case: V-DFN2050-4
- Case Material: Molded Plastic, "Green" Molding Compound.
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper Leadframe.
Solderable per MIL-STD-202, Method 208④
- Weight: 0.01 grams (Approximate)



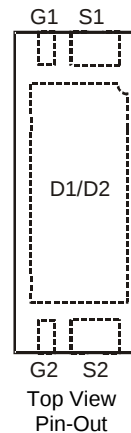
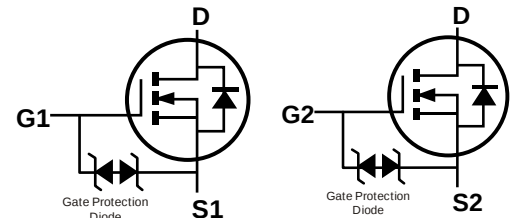
V-DFN2050-4



Top View



Bottom View

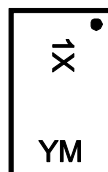

Top View
Pin-Out


Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2011UFX-7	V-DFN2050-4	3,000 / 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 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


1X = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: B = 2014)
M = Month (ex: 9 = September)

Date Code Key

Year	2014	2015	2016	2017	2018	2019	2020
Code	B	C	D	E	F	G	H

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

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}	±12	V
Continuous Drain Current (Note 6) V _{GS} = 4.5V	Steady State	T _A = +25°C T _A = +70°C	I _D	12.2 9.8	A
Continuous Drain Current (Note 6) V _{GS} = 2.5V	Steady State	T _A = +25°C T _A = +70°C	I _D	10.4 8.3	A
Pulsed Drain Current (10μs pulse, duty cycle = 1%)			I _{DM}	80	A
Maximum Body Diode Continuous Current			I _S	2.5	A
Avalanche Current (Note 7) L = 0.1mH			I _{AS}	18	A
Repetitive Avalanche Energy (Note 7) L = 0.1mH			E _{AS}	17	mJ

Thermal Characteristics

Characteristic	Symbol	Max	Unit
Power Dissipation (Note 6)	P _D	2.1	W
Thermal Resistance, Junction to Ambient @T _A = +25°C (Note 6)	R _{θJA}	59.1	°C/W
Thermal Resistance, Junction to Case (Note 6)	R _{θJC}	7.1	°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 8)						
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} = 16V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	μA	V _{GS} = ±10V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(th)}	0.3	—	1.0	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(on)}	—	—	9.5	mΩ	V _{GS} = 4.5V, I _D = 10A
			—	10		V _{GS} = 4.0V, I _D = 10A
			—	10.5		V _{GS} = 3.5V, I _D = 9A
			—	11.5		V _{GS} = 3.1V, I _D = 9A
			—	13		V _{GS} = 2.5V, I _D = 8A
Diode Forward Voltage	V _{SD}	—	—	1.2	V	V _{GS} = 0V, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	2,248	—	pF	V _{DS} = 10V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	295	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	265	—	pF	
Gate Resistance	R _g	—	1.5	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	24	—	nC	V _{DS} = 10V, I _D = 8.5A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	56	—	nC	
Gate-Source Charge	Q _{gs}	—	3.5	—	nC	
Gate-Drain Charge	Q _{gd}	—	5.1	—	nC	
Turn-On Delay Time	t _{D(on)}	—	3.6	—	ns	V _{DS} = 10V, I _D = 8.5A V _{GS} = 4.5V, R _G = 1.8Ω
Turn-On Rise Time	t _r	—	2.6	—	ns	
Turn-Off Delay Time	t _{D(off)}	—	21.6	—	ns	
Turn-Off Fall Time	t _f	—	13.5	—	ns	
Body Diode Reverse Recovery Time	t _{rr}	—	12.8	—	nS	I _F = 8.5A, dI/dt = 210A/μs
Body Diode Reverse Recovery Charge	Q _{rr}	—	6.9	—	nC	I _F = 8.5A, dI/dt = 210A/μs

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

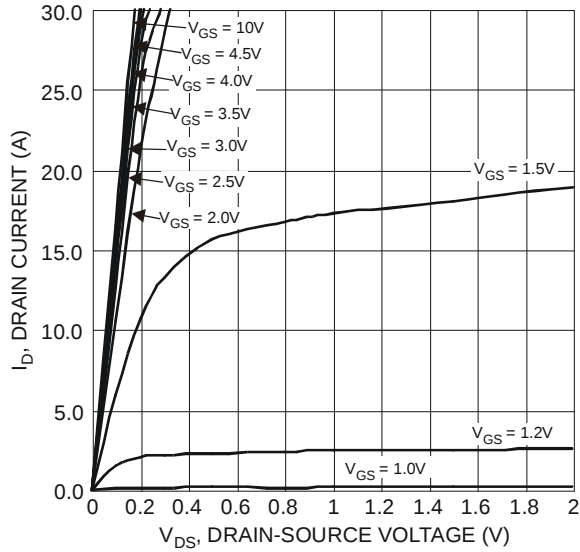


Figure 1 Typical Output Characteristics

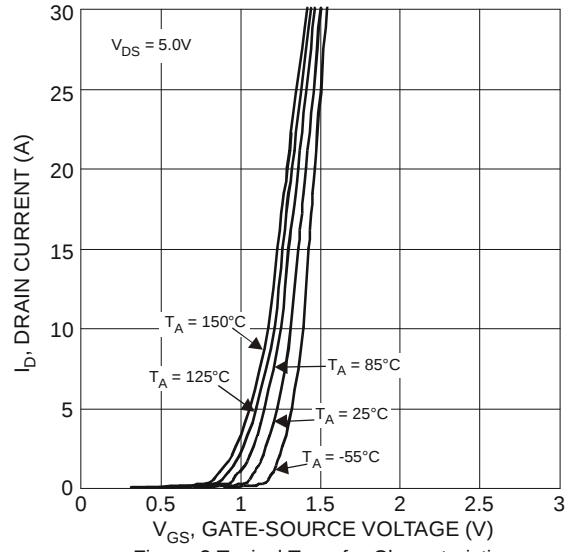


Figure 2 Typical Transfer Characteristics

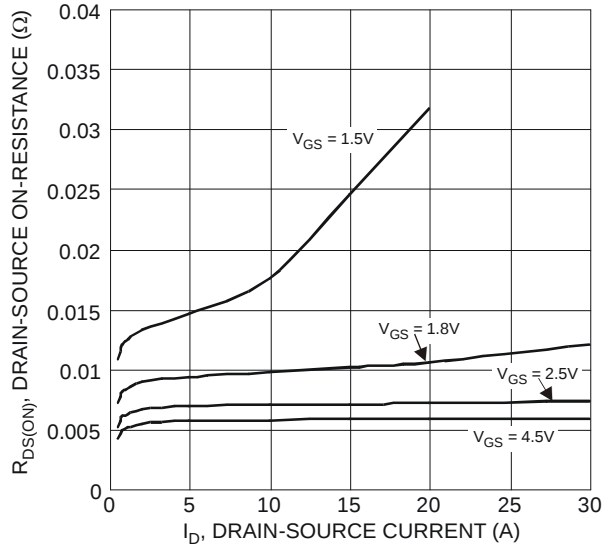


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

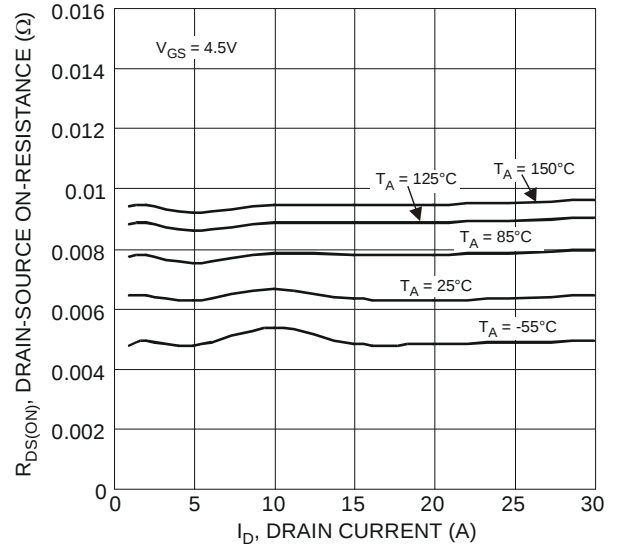


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

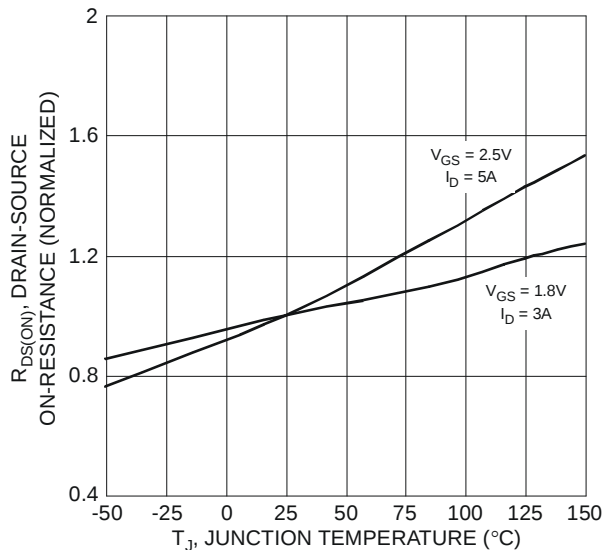


Figure 5 On-Resistance Variation with Temperature

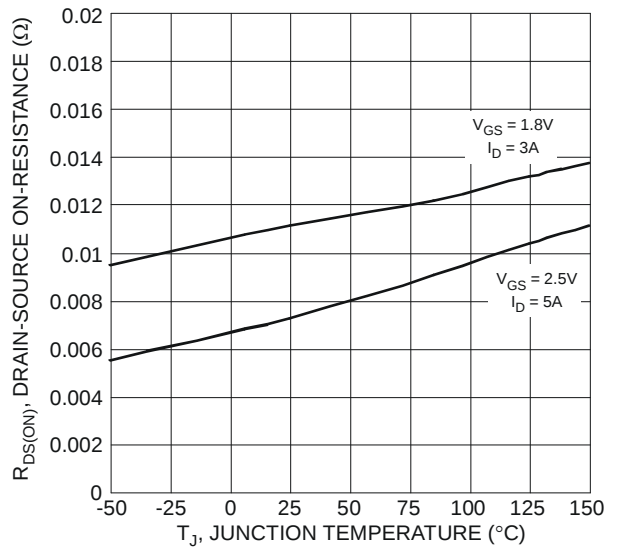


Figure 6 On-Resistance Variation with Temperature

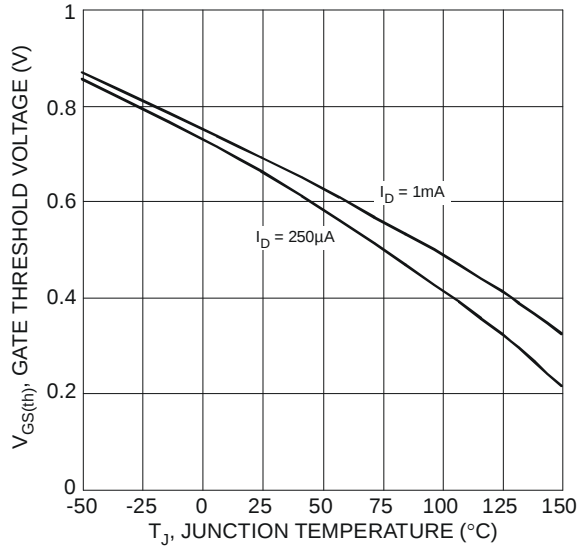


Figure 7 Gate Threshold Variation vs. Ambient Temperature

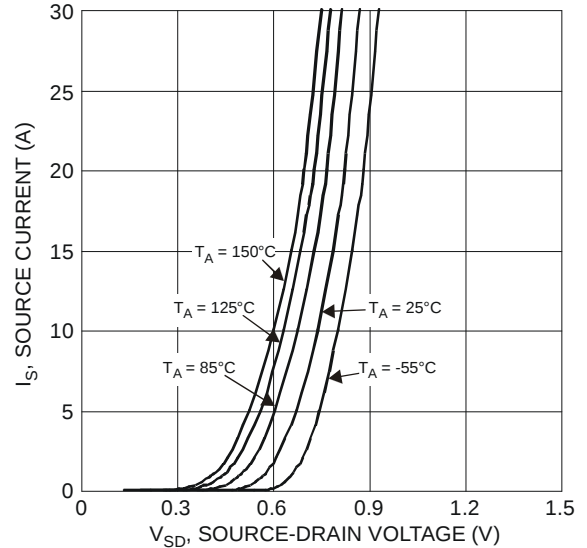


Figure 8 Diode Forward Voltage vs. Current

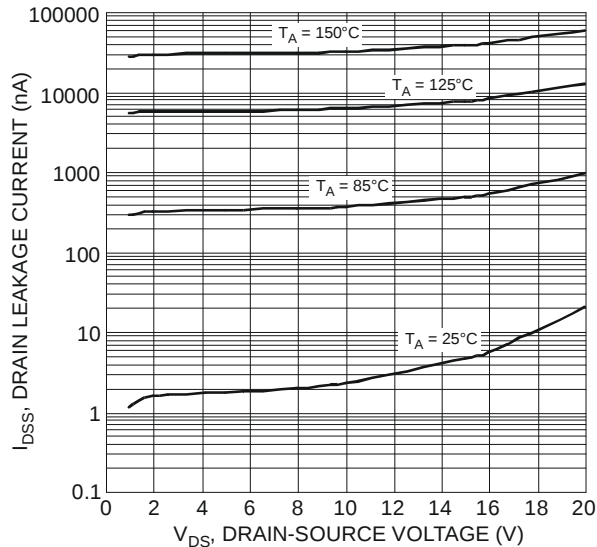


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

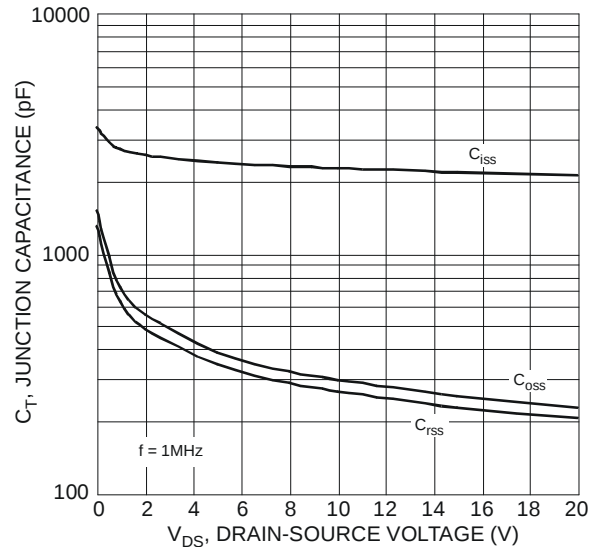


Figure 10 Typical Junction Capacitance

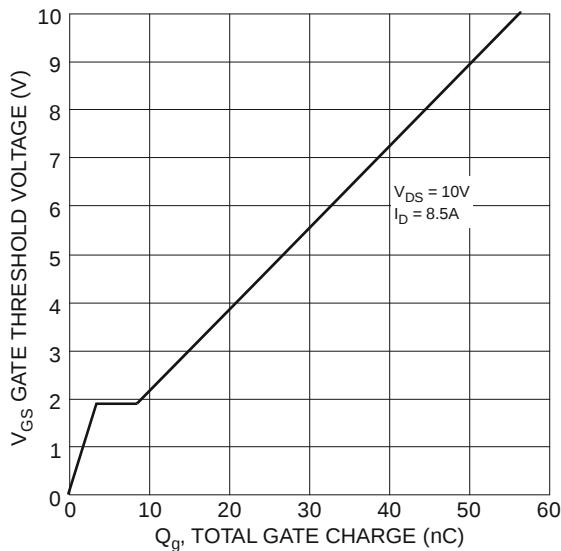


Figure 11 Gate Charge

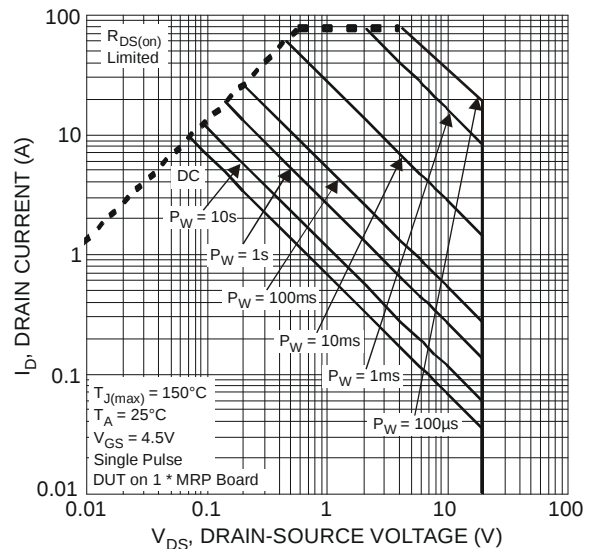


Figure 12 SOA, Safe Operation Area

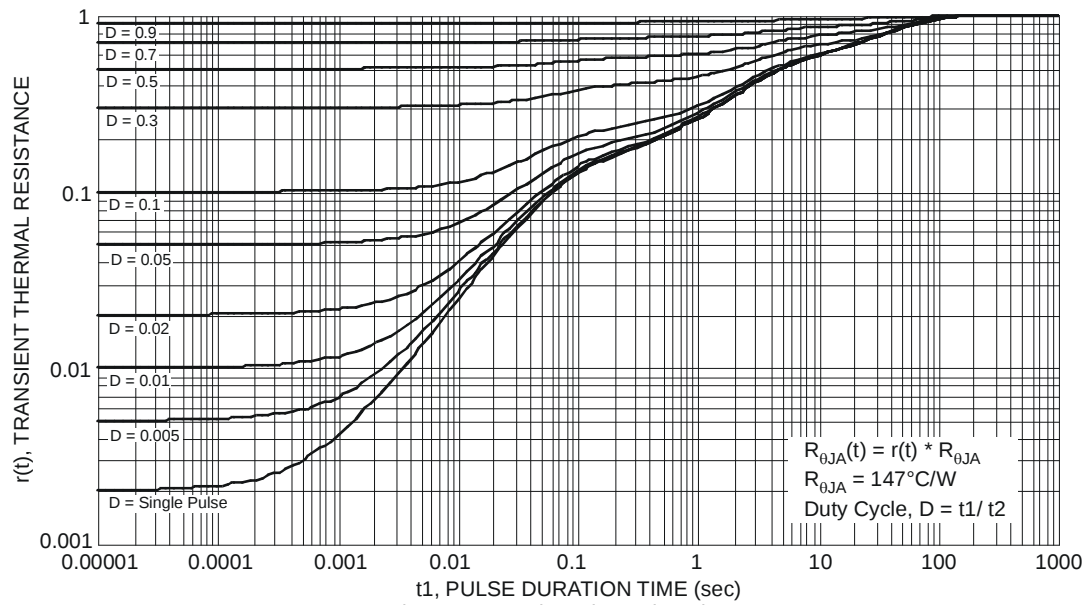
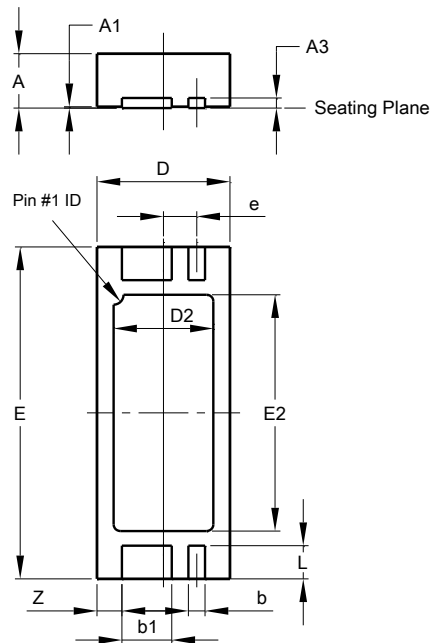


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

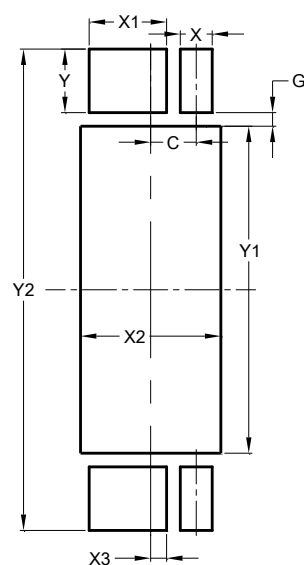
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



V-DFN2050-4			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0	0.05	0.02
A3	-	-	0.15
b	0.20	0.30	0.25
b1	0.70	0.80	0.75
D	1.90	2.10	2.00
D2	1.40	1.60	1.50
E	4.90	5.10	5.00
E2	3.46	3.66	3.56
e	0.50 BSC		
L	0.35	0.65	0.50
Z	-	-	0.375
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
C	0.500
G	0.150
X	0.350
X1	0.850
X2	1.540
X3	0.175
Y	0.700
Y1	3.600
Y2	5.300

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