

DUAL N-CHANNEL ENHANCEMENT MODE MOSFET
Product Summary

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

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**

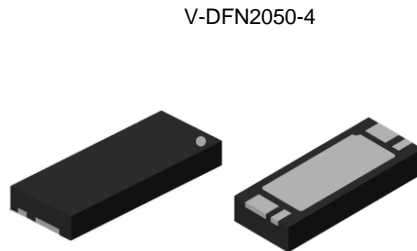
Description and Applications

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

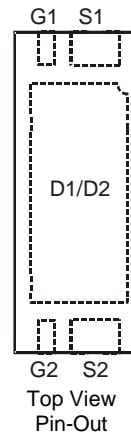
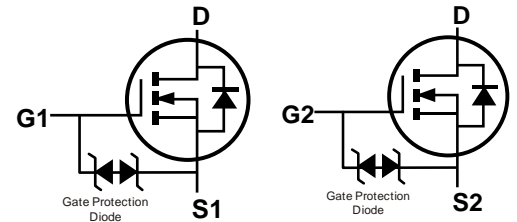
Mechanical Data

- 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)



Top View

Bottom View

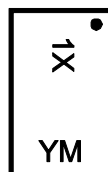

 Top View
Pin-Out


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

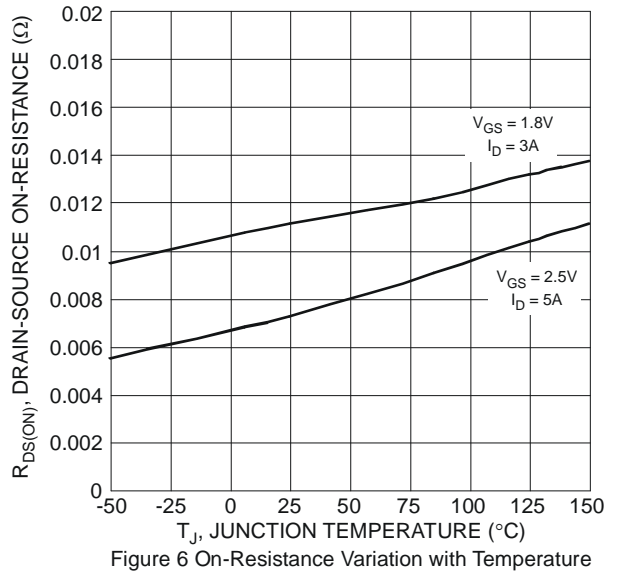
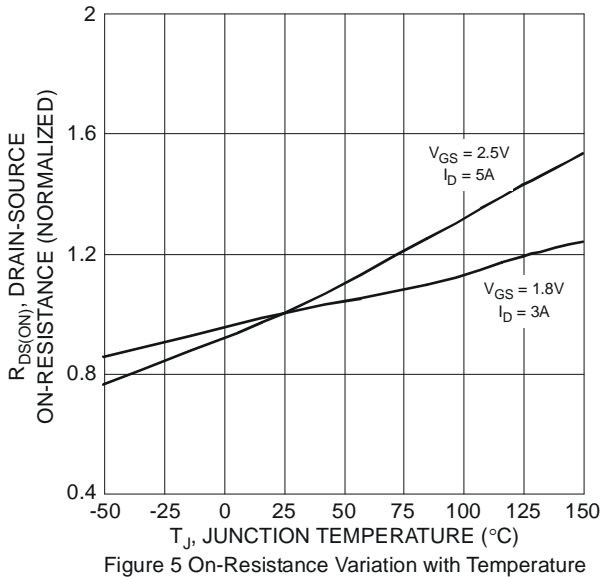
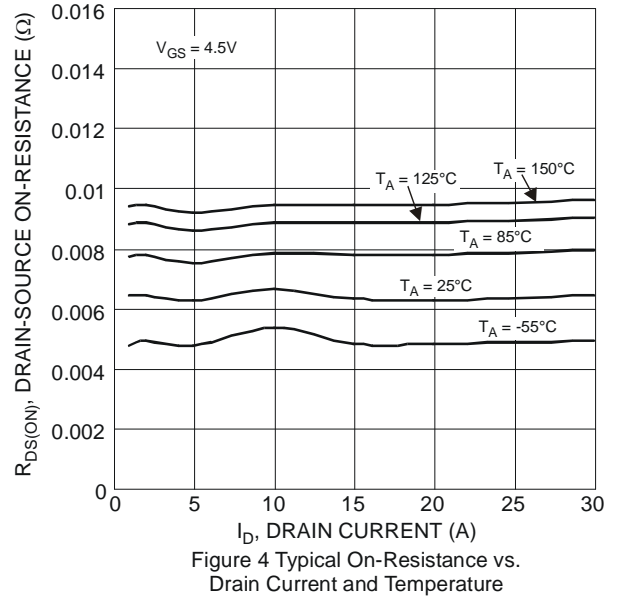
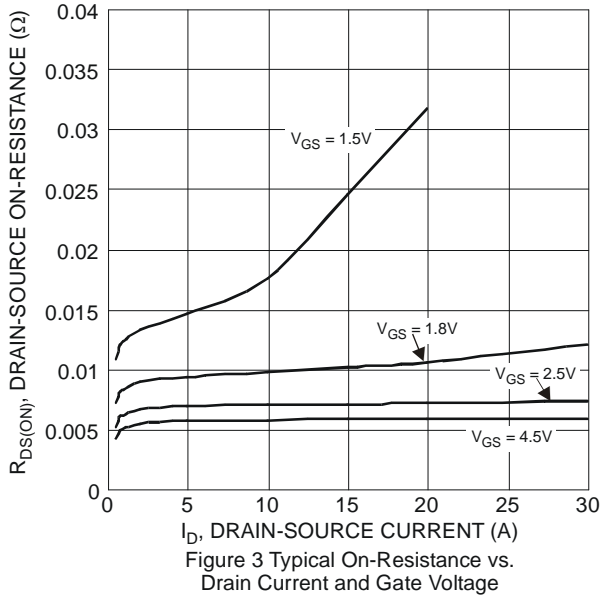
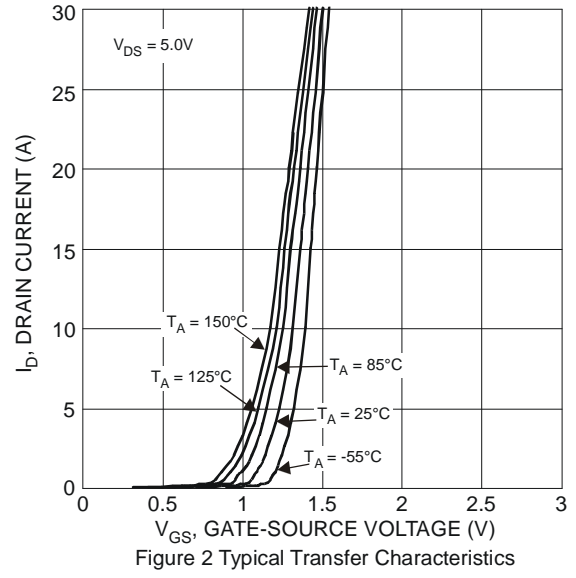
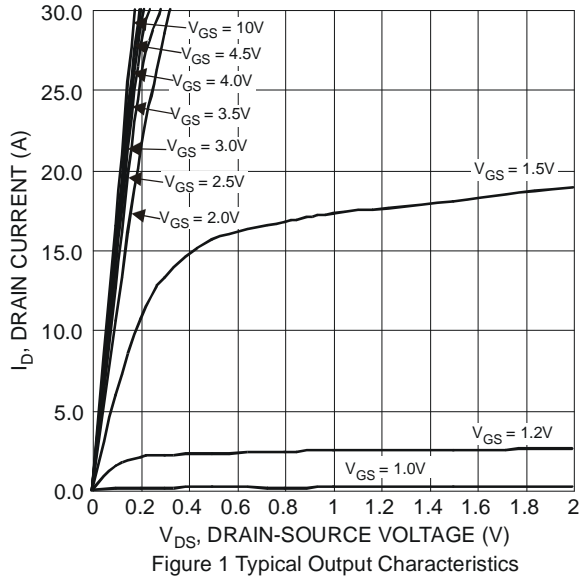
Thermal Characteristics

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.



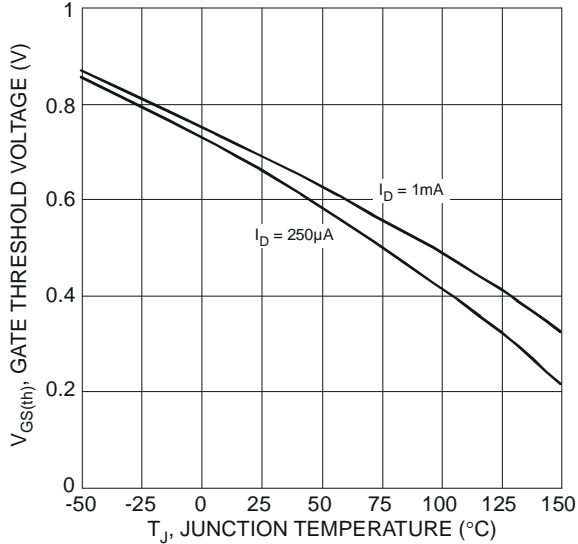


Figure 7 Gate Threshold Variation vs. Ambient Temperature

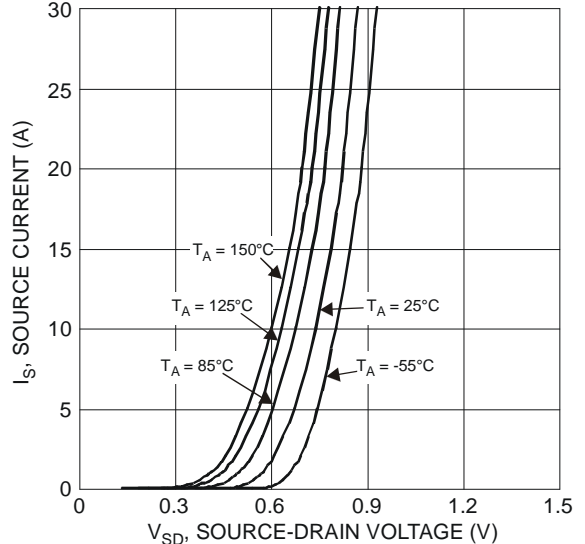


Figure 8 Diode Forward Voltage vs. Current

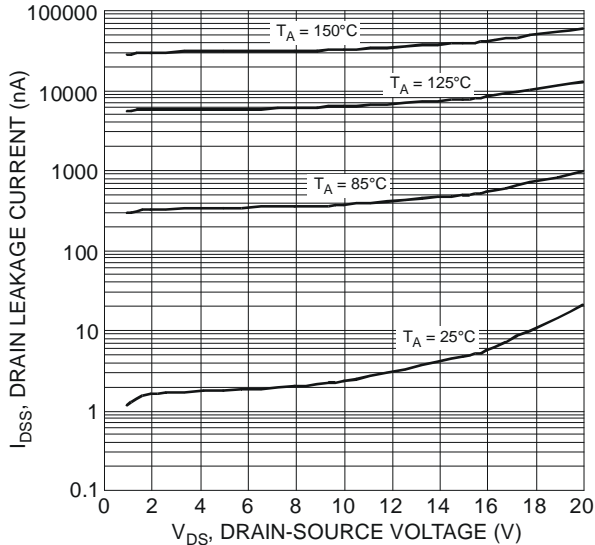


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

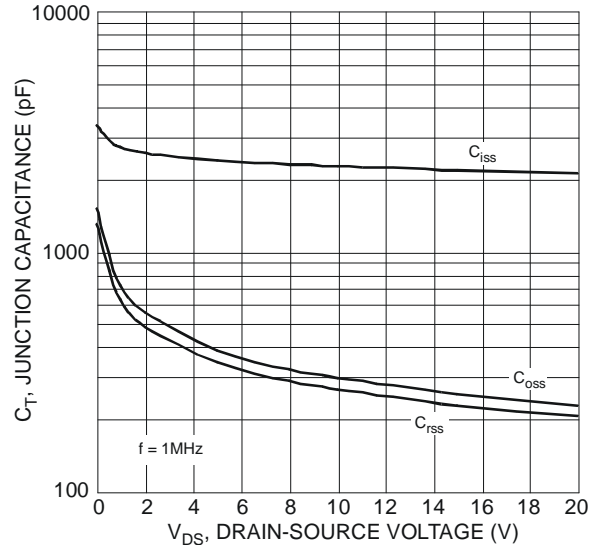


Figure 10 Typical Junction Capacitance

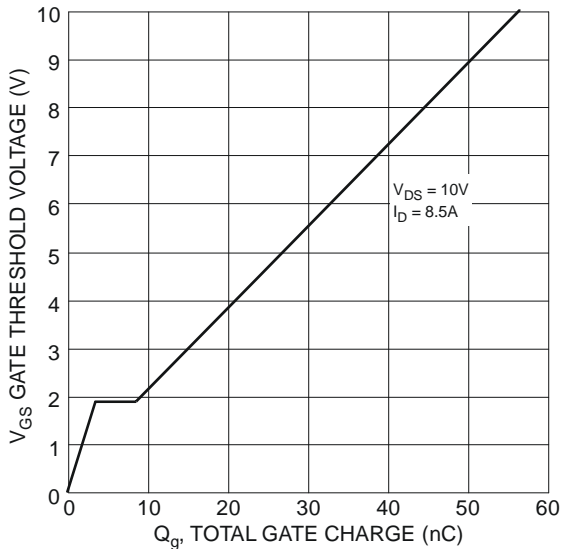


Figure 11 Gate Charge

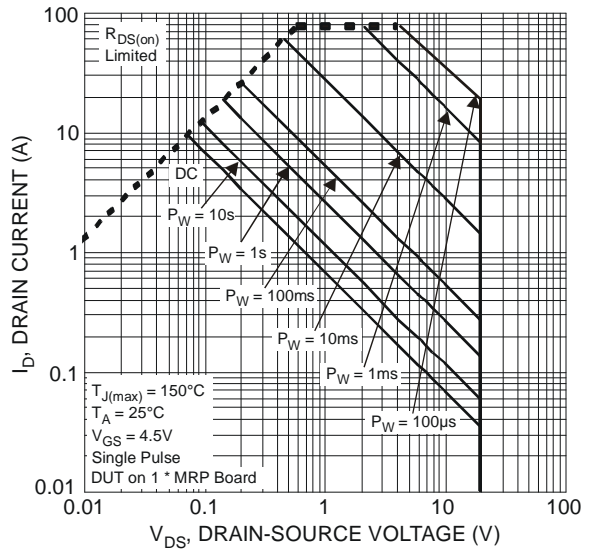
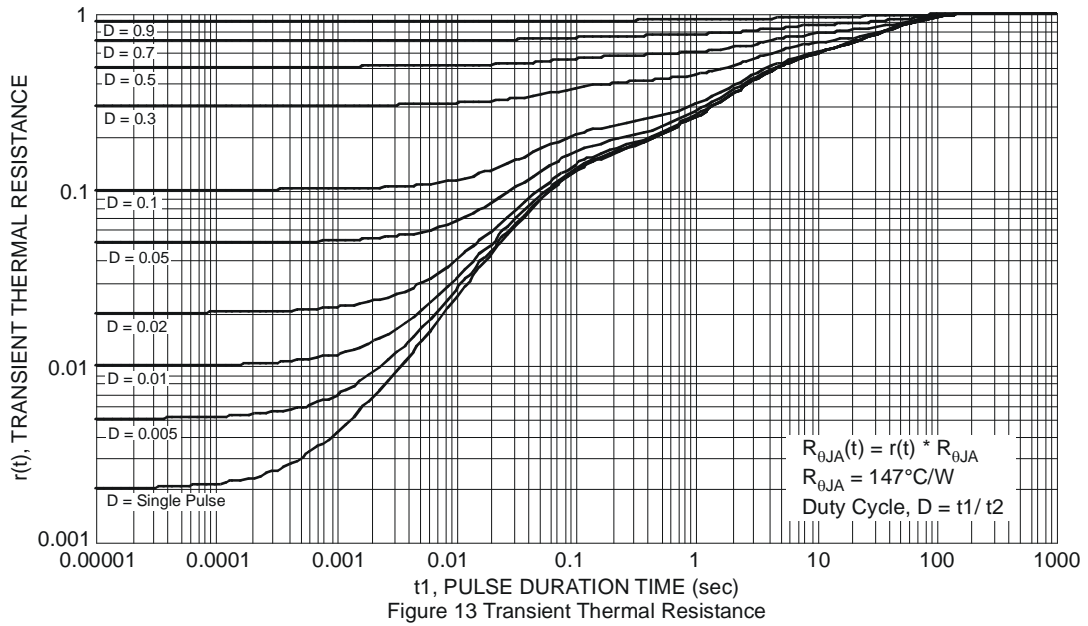
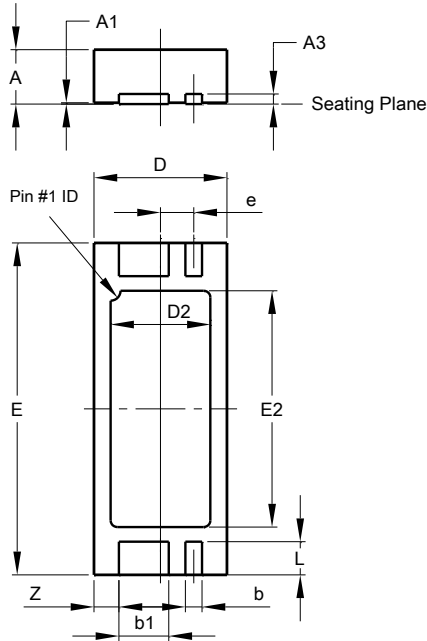


Figure 12 SOA, Safe Operation Area



Package Outline Dimensions

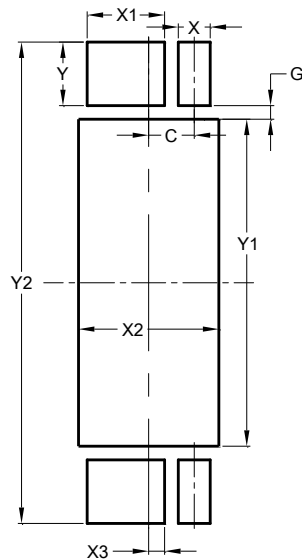
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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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