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DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

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

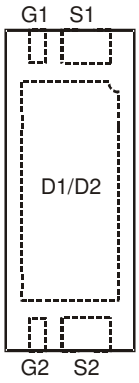
Mechanical Data

- 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 208 e4
- Weight: 0.01 grams (Approximate)

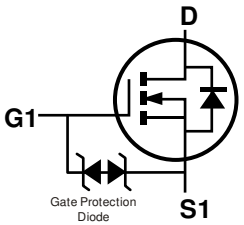
V-DFN2050-4

Top View

Bottom View



Top View
Pin-Out



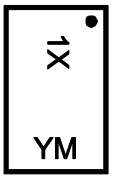
Equivalent Circuit

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.htmlfor 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)	$R_{\theta JA}$	59.1	°C/W
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	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: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7. I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

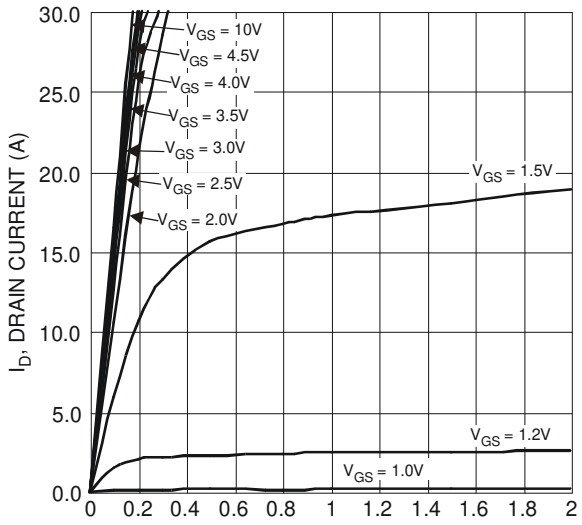


Figure 1 Typical Output Characteristics

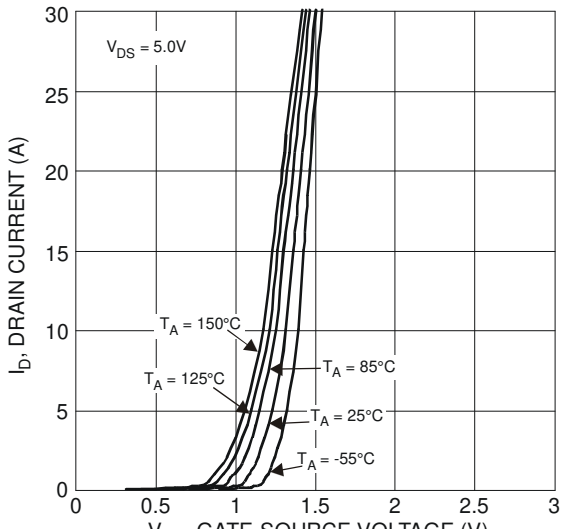


Figure 2 Typical Transfer Characteristics

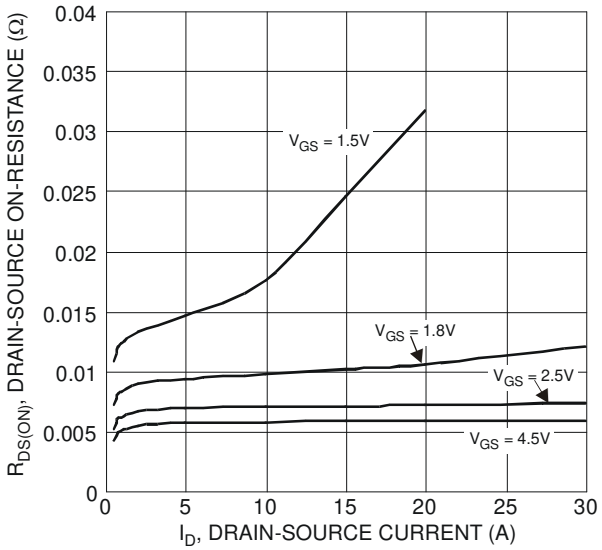


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

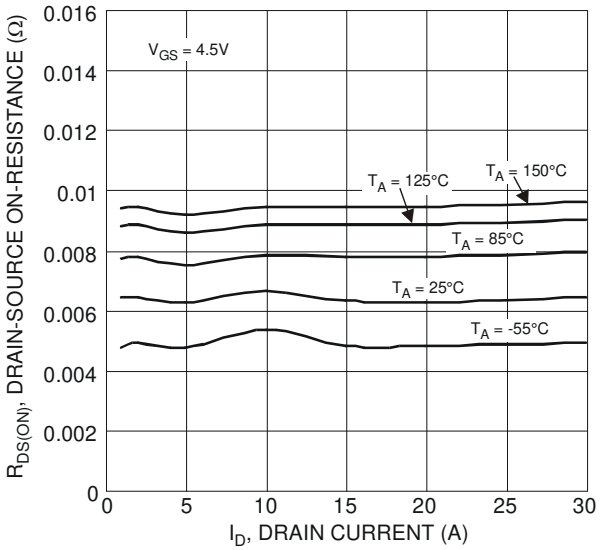


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

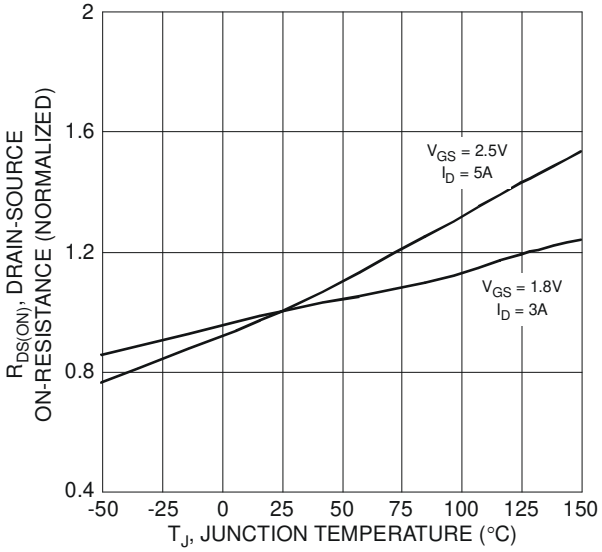


Figure 5 On-Resistance Variation with Temperature

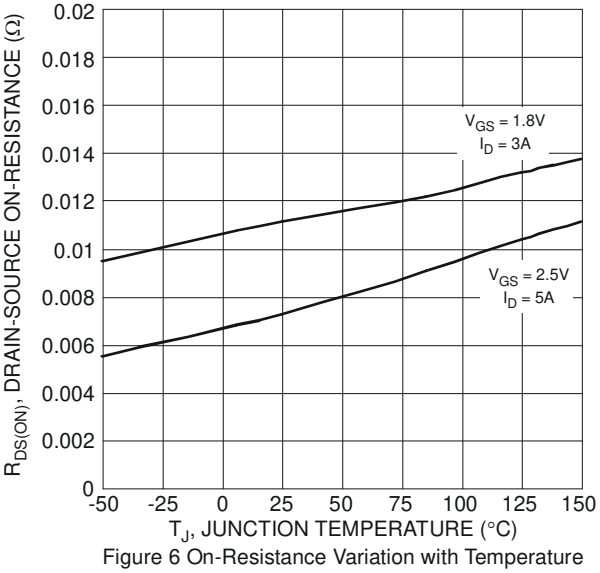


Figure 6 On-Resistance Variation with Temperature

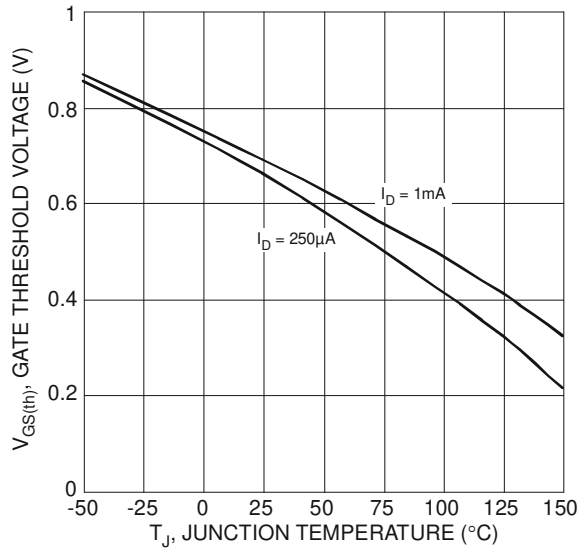


Figure 7 Gate Threshold Variation vs. Ambient Temperature

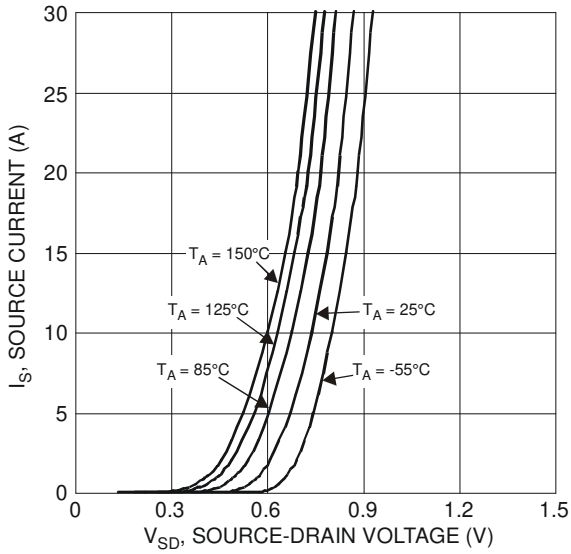


Figure 8 Diode Forward Voltage vs. Current

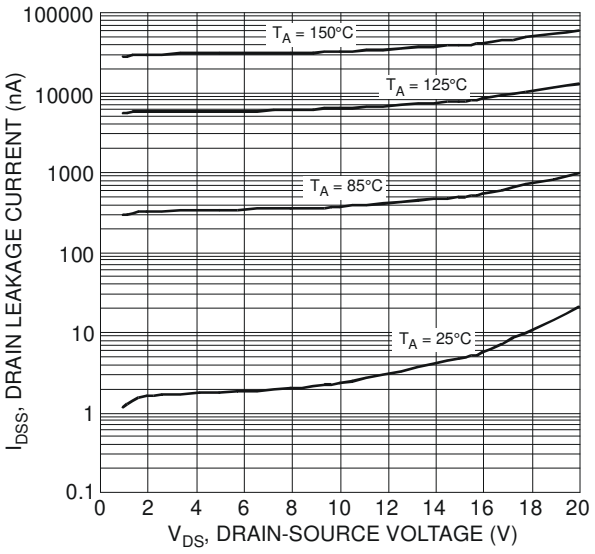


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

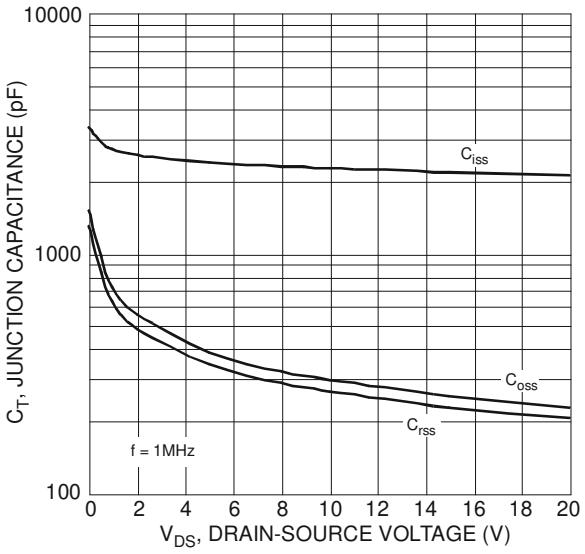


Figure 10 Typical Junction Capacitance

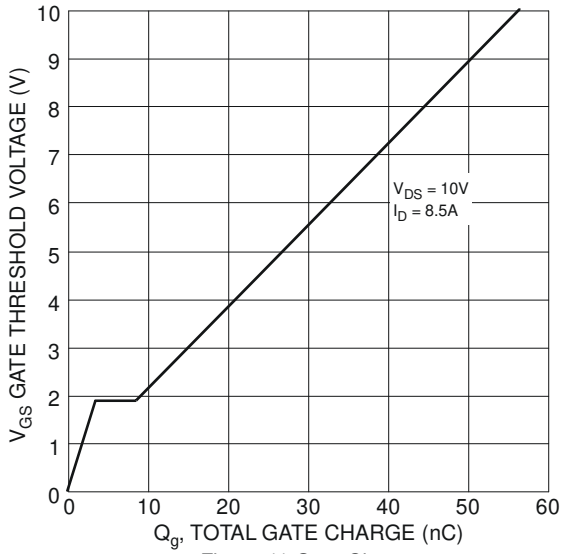


Figure 11 Gate Charge

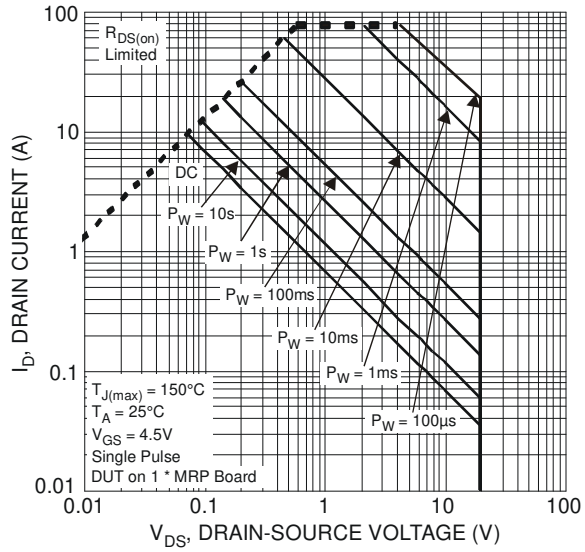


Figure 12 SOA, Safe Operation Area

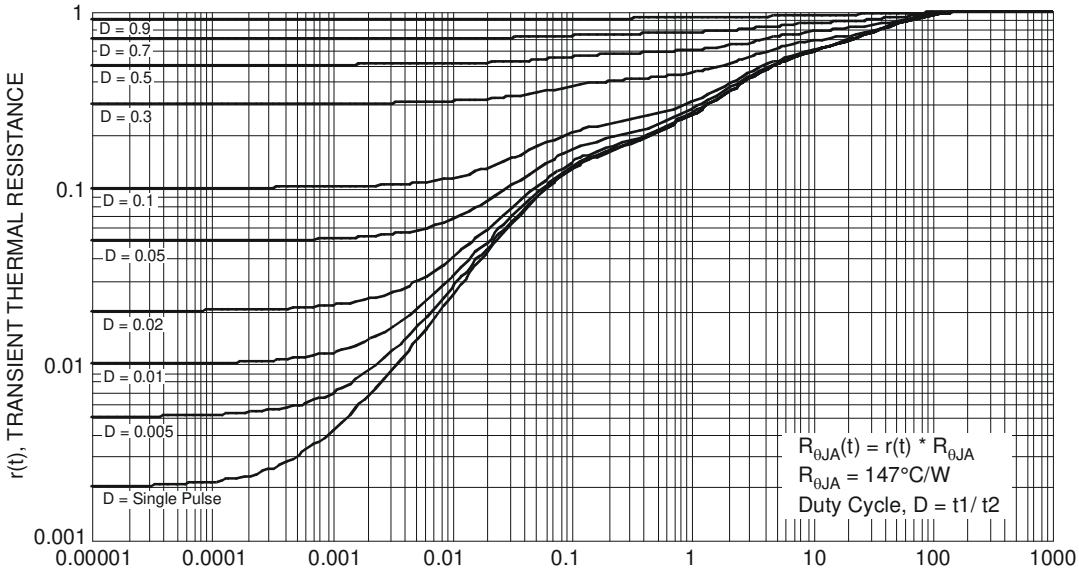
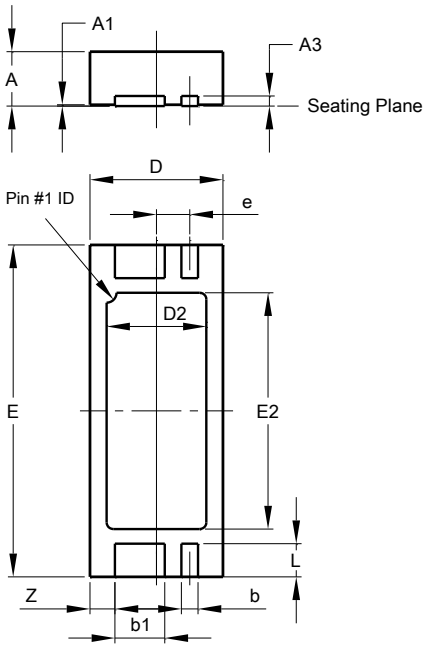


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

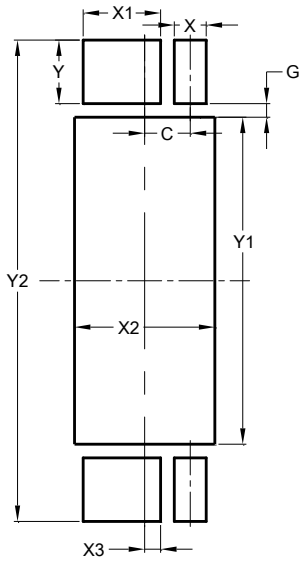
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



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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