P-CHANNEL ENHANCEMENT MODE MOSFET WITH INTEGRATED SBR® SUPER BARRIER RECTIFIER

Features

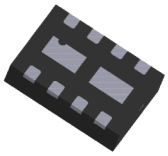
- Low On-Resistance
  - 95mΩ @V_{GS} = -4.5V
  - 120mΩ @V_{GS} = -2.5V
  - 150mΩ (typ) @V_{GS} = -1.8V
- Low Gate Threshold Voltage, -1.3V Max
- Fast Switching Speed
- Low Input/Output Leakage
- Incorporates Low V_F Super Barrier Rectifier (SBR)
- Low Profile, 0.5mm Max Height
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

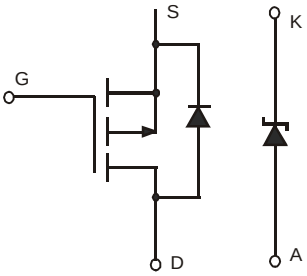
- Case: U-DFN3020-8 Type B
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – NiPdAu annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 e4
- Weight: 0.011 grams (approximate)

U-DFN3020-8
Type B

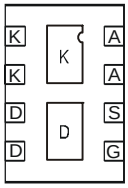
Top View



Bottom View



Equivalent Circuit



Bottom View
Pin Configuration

Ordering Information (Note 4)

Part Number	Case	Packaging
DMS2120LFWB-7	DFN3020B-8	3000/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 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.

Marking Information

MF = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: V = 2008)
M = Month (ex: 9 = September)

Date Code Key

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Code	V	W	X	Y	Z	A	B	C	D	E

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

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	1.5	W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	85	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Maximum Ratings – P-CHANNEL MOSFET – Q1 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V_{DSS}	-20	V
Gate-Source Voltage	V_{GSS}	±12	V
Drain Current (Note 5)	I_D	-2.9	A
Pulsed Drain Current (Note 6)	I_{DM}	-10	A

Maximum Ratings – SBR – D1 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	20	V
RMS Reverse Voltage	$V_{R(RMS)}$	14	V
Average Rectified Output Current	I_O	1	A
Non-Repetitive Peak Forward Surge Current 8.3ms single half sine-wave superimposed on rated load	I_{FSM}	3	A

Electrical Characteristics – P-CHANNEL MOSFET – Q1 (@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}	-20	—	—	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	V_{DS} = -20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	— —	— —	±100 ±800	nA	V_{GS} = ±8V, V_{DS} = 0V V_{GS} = ±12V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.45	—	-1.3	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	— — —	70 84 100	95 120 150	mΩ	V_{GS} = -4.5V, I_D = -2.8A V_{GS} = -2.5V, I_D = -2.0A V_{GS} = -1.8V, I_D = -1.0A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	8	—	S	V_{DS} = -5V, I_D = -2.8A
Diode Forward Voltage (Note 7)	V_{SD}	—	0.42	-1.2	V	V_{GS} = 0V, I_S = -1.0A
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{iss}	—	632	—	pF	V_{DS} = -10V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	65	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	54	—	pF	

Electrical Characteristics – SBR – D1 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Breakdown Voltage (Note 7)	$V_{(BR)R}$	20	—	—	V	I_R = 1mA
Forward Voltage	V_F	— —	— —	0.45 0.52	V	I_F = 0.5A I_F = 1.0A
Reverse Current (Note 7)	I_R	—	—	80	μA	V_R = 20V

Notes: 5. Device mounted on FR-4 PCB, on minimum recommended, 2oz Copper pad layout.
6. Repetitive rating, pulse width limited by junction temperature.
7. Short duration pulse test used to minimize self-heating effect.

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Q1, P-CHANNEL MOSFET

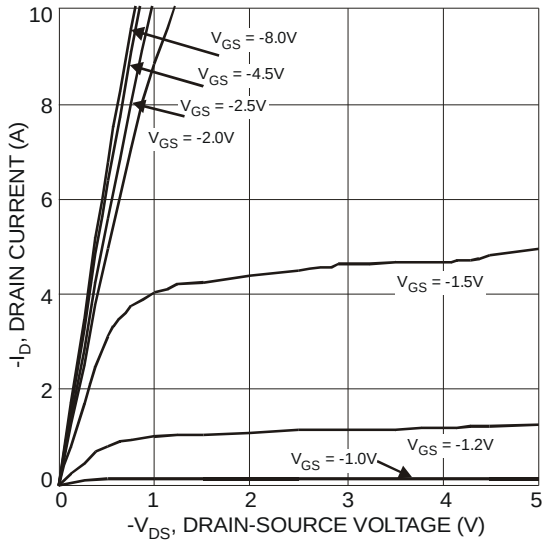

Fig. 1 Typical Output Characteristics

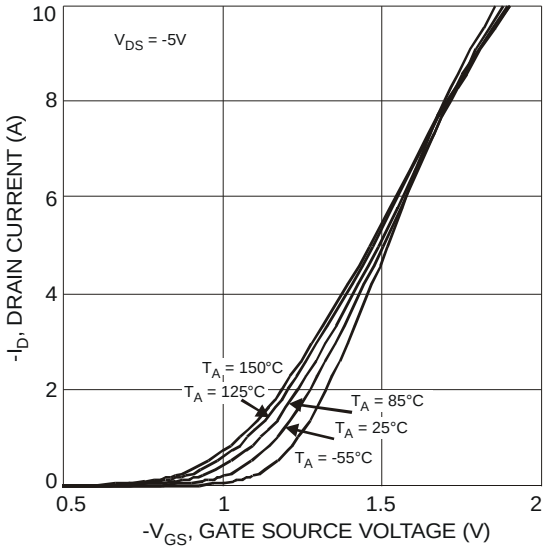

Fig. 2 Typical Transfer Characteristics

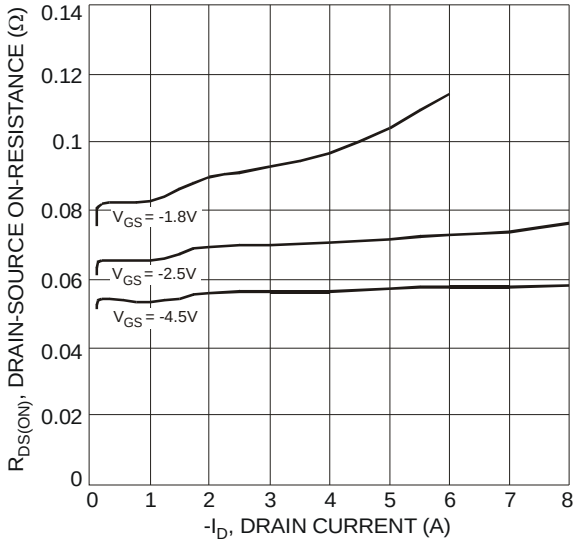

Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

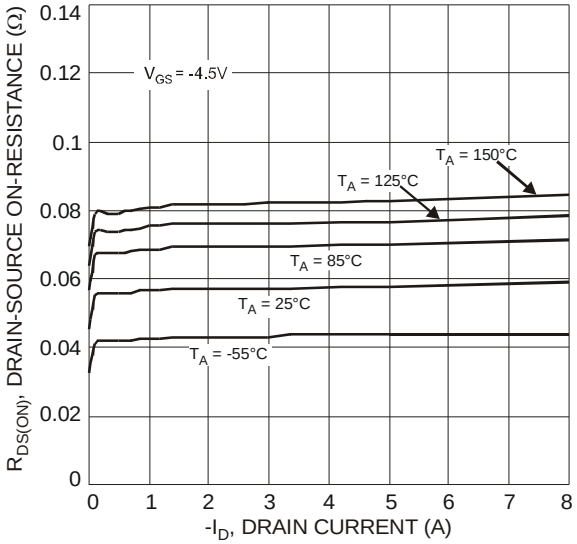

Fig. 4 Typical Drain-Source On-Resistance
vs. Drain Current and Temperature

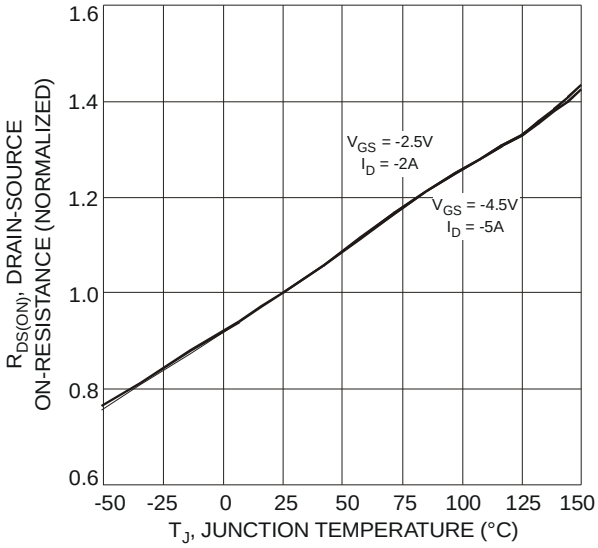

Fig. 5 On-Resistance Variation with Temperature

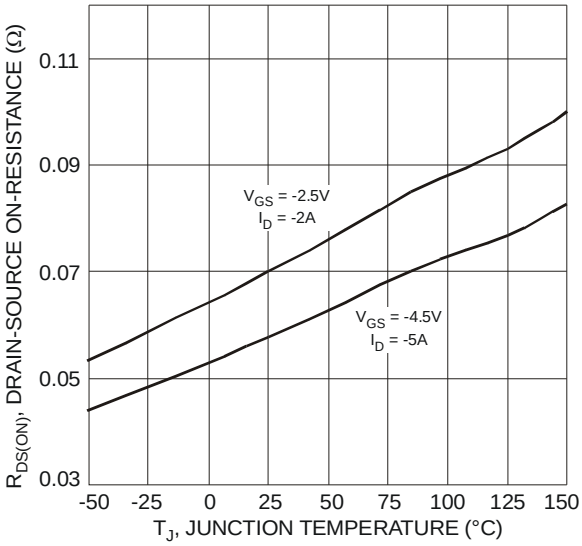

Fig. 6 On-Resistance Variation with Temperature

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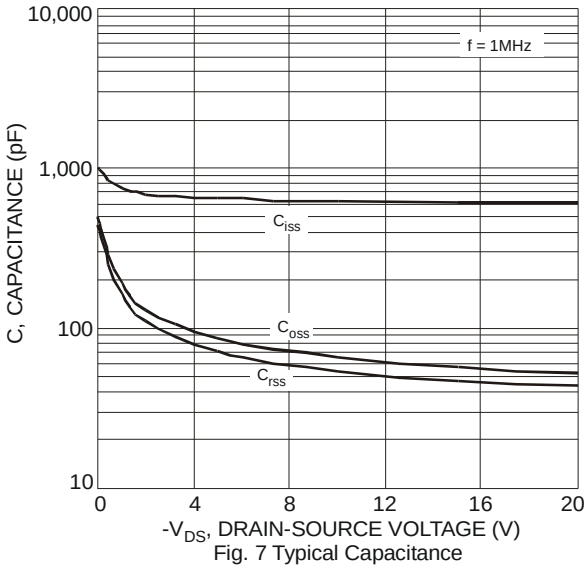

Fig. 7 Typical Capacitance

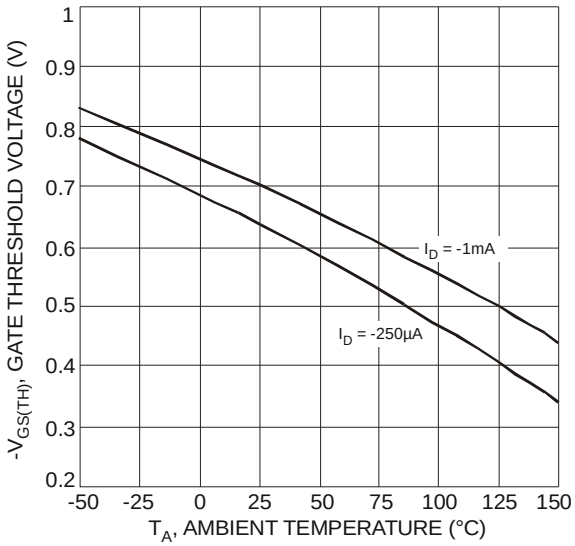

Fig. 8 Gate Threshold Variation vs. Ambient Temperature

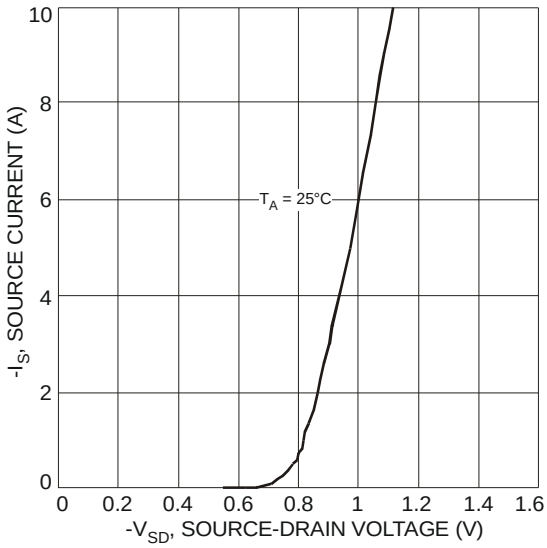

Fig. 9 Diode Forward Voltage vs. Current

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D1, SBR

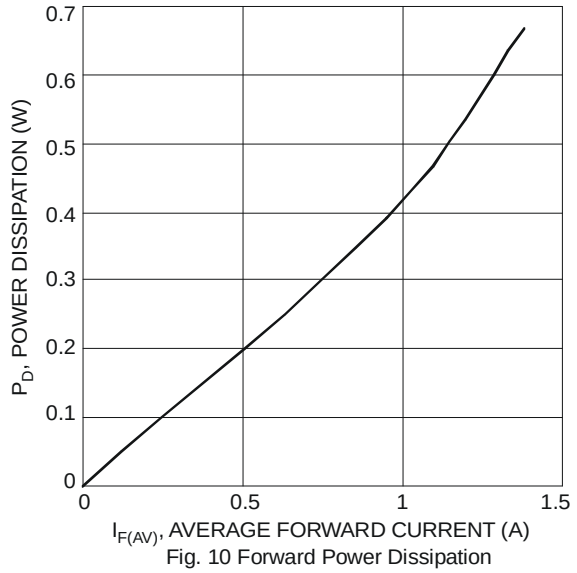

Fig. 10 Forward Power Dissipation

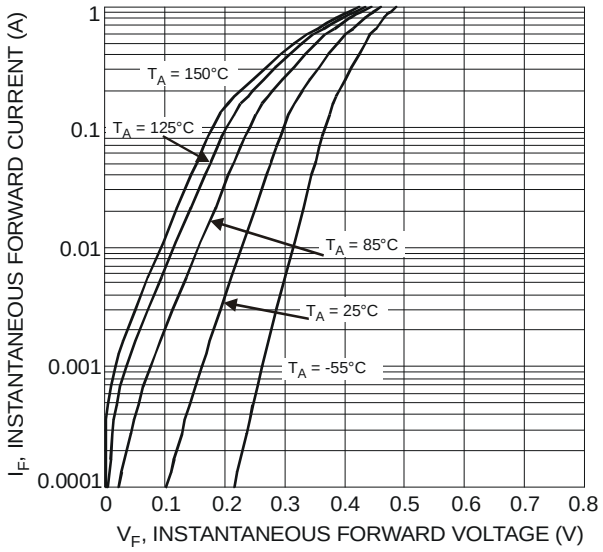

Fig. 11 Typical Forward Characteristics

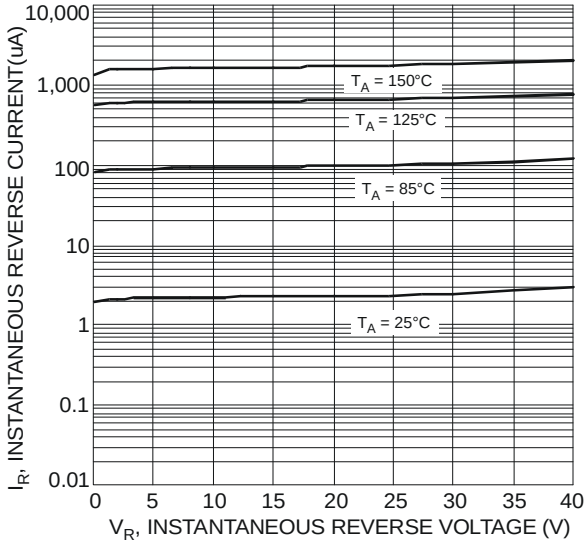

Fig. 12 Typical Reverse Characteristics

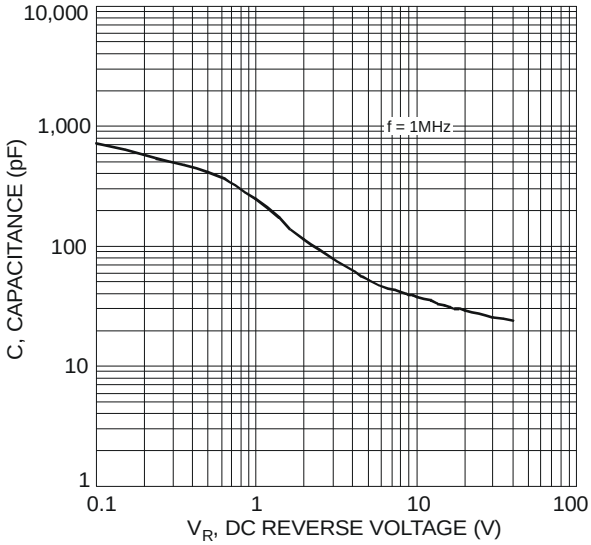

Fig. 13 Total Capacitance vs. Reverse Voltage

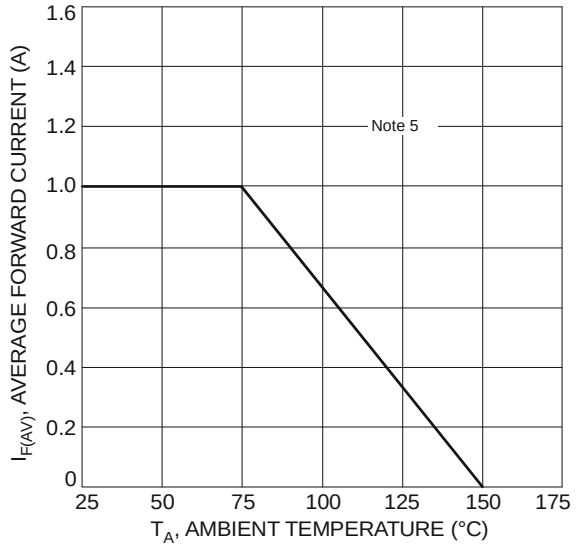

Fig. 14 Forward Current Derating Curve

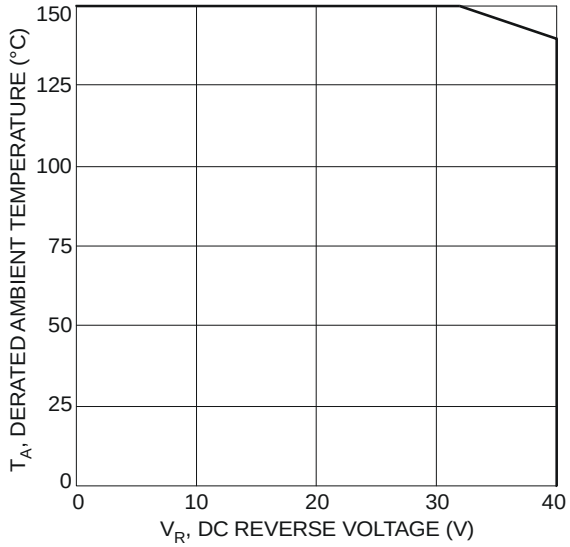

Fig. 15 Operating Temperature Derating

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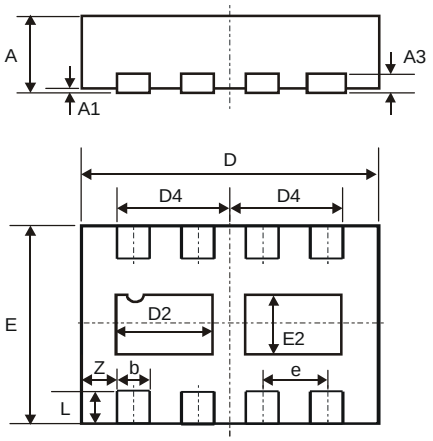
Package Outline Dimensions

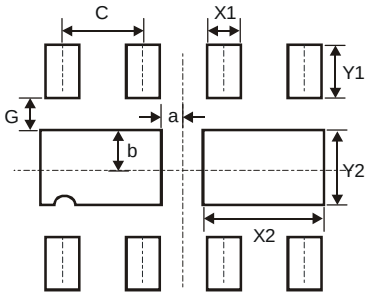
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



U-DFN3020-8 Type B			
Dim	**Min**	**Max**	**Typ**
A	0.77	0.83	0.80
A1	0	0.05	0.02
A3	-	-	0.15
b	0.25	0.35	0.30
D	2.95	3.075	3.00
D2	0.82	1.02	0.92
D4	1.01	1.21	1.11
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.43	0.63	0.53
L	0.25	0.35	0.30
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)
a	0.09
b	0.365
C	0.65
G	0.285
X1	0.4
X2	1.12
Y1	0.5
Y2	0.73

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

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AVIC JONHON

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Телефон: 8 (812) 309-75-97 (многоканальный)
Факс: 8 (812) 320-03-32
Электронная почта: ocean@oceanchips.ru
Web: http://oceanchips.ru/
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А