

**20V DUAL N-CANNEL ENHANCEMENT MODE MOSFET**
**Product Summary**

$V_{(BR)DSS}$	Max $R_{DS(on)}$	$I_D$ max $T_A = +25^{\circ}C$ (Note 6)
20V	195m $\Omega$ @ $V_{GS} = 4.5V$	2.11A
	260m $\Omega$ @ $V_{GS} = 2.5V$	1.83A
	380m $\Omega$ @ $V_{GS} = 1.8V$	1.51A
	520m $\Omega$ @ $V_{GS} = 1.5V$	1.29A

**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.

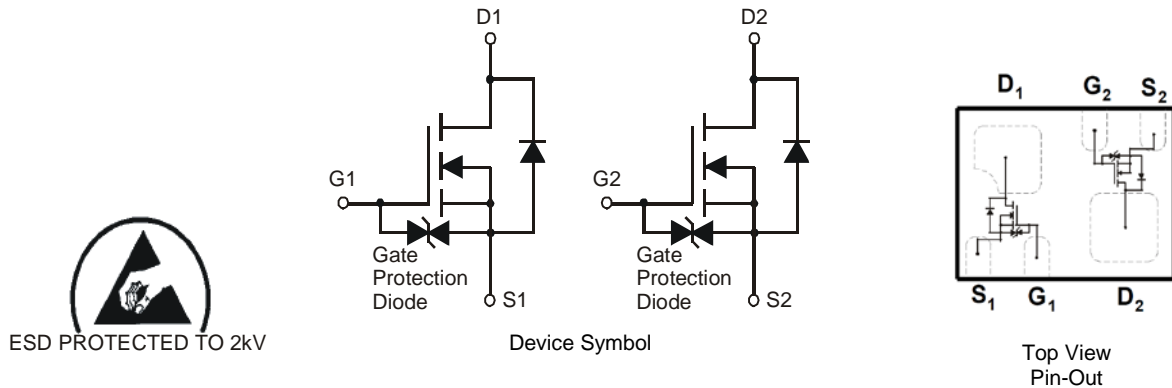
- Load switch

**Features and Benefits**

- Footprint of Just 1.3 mm<sup>2</sup>
- Ultra Low Profile Package - 0.4mm Profile
- On Resistance <200m $\Omega$
- Low Gate Threshold Voltage
- Fast Switching Speed
- Ultra-Small Surface Mount Package
- ESD Protected Gate 2KV**
- 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: X2-DFN1310-6
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208④


**Ordering Information (Note 4)**

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN2300UFL4-7	23N	7	8	3000

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  - See [http://www.diodes.com/quality/lead\\_free.html](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.
  - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**


23N = Product Type Marking Code

## Maximum Ratings @T<sub>A</sub> = +25°C unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	20	V
Gate-Source Voltage			V <sub>GSS</sub>	±8	V
Continuous Drain Current (Note 6)	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	2.11	A
		T <sub>A</sub> = +85°C		1.19	
Pulsed Drain Current (Note 7)			I <sub>DM</sub>	6.0	A

## Thermal Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P <sub>D</sub>	0.53	W
	(Note 6)		1.39	
Thermal Resistance, Junction to Ambient	(Note 5)	R <sub>θJA</sub>	238	°C/W
	(Note 6)		90	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- 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 1 inch square copper plate.
  7. Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.

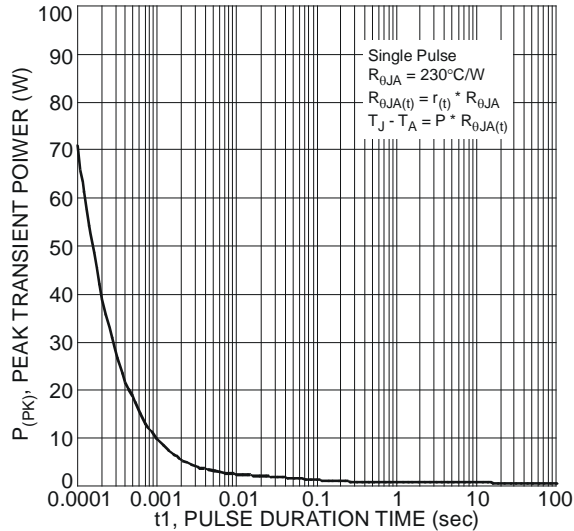


Fig. 1 Single Pulse Maximum Power Dissipation

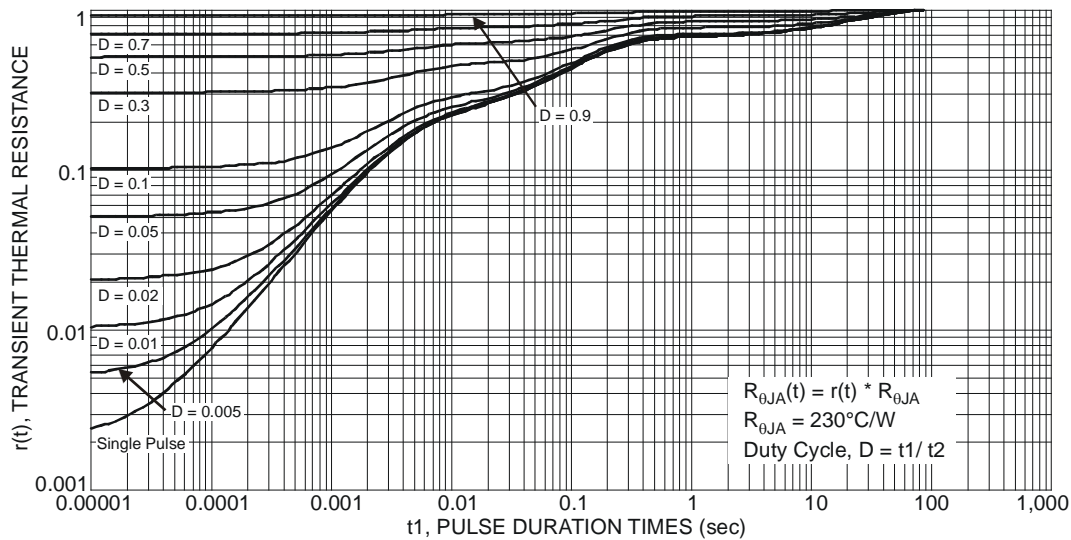


Fig. 2 Transient Thermal Resistance

**Electrical Characteristics** @T<sub>A</sub> = +25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	20	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 10μA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	10	μA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.45	-	0.95	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-	-	195	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 300mA
		-	-	260		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 250mA
		-	-	380		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 100mA
		-	-	520		V <sub>GS</sub> = 1.5V, I <sub>D</sub> = 50mA
		-	-	-		V <sub>GS</sub> = 1.2V, I <sub>D</sub> = 25mA
Forward Transfer Admittance	Y <sub>fs</sub>	40	-	-	mS	V <sub>DS</sub> = 3V, I <sub>D</sub> = 30mA
Diode Forward Voltage	V <sub>SD</sub>	-	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 300mA
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	C <sub>iss</sub>	-	64.3	128.6	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	6.1	12.2	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	4.5	9.0	pF	
Gate Resistance	R <sub>g</sub>	-	70	140	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge	Q <sub>g</sub>	-	1.6	3.2	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 15V, I <sub>D</sub> = 1A
Gate-Source Charge	Q <sub>gs</sub>	-	0.2	0.4	nC	
Gate-Drain Charge	Q <sub>gd</sub>	-	0.2	0.4	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	-	3.5	10	ns	V <sub>DS</sub> = 10V, I <sub>D</sub> = 1A V <sub>GS</sub> = 10V, R <sub>G</sub> = 6Ω
Turn-On Rise Time	t <sub>r</sub>	-	2.8	10	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	-	38	60	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	13	25	ns	

Note: 8. Short duration pulse test used to minimize self-heating effect.

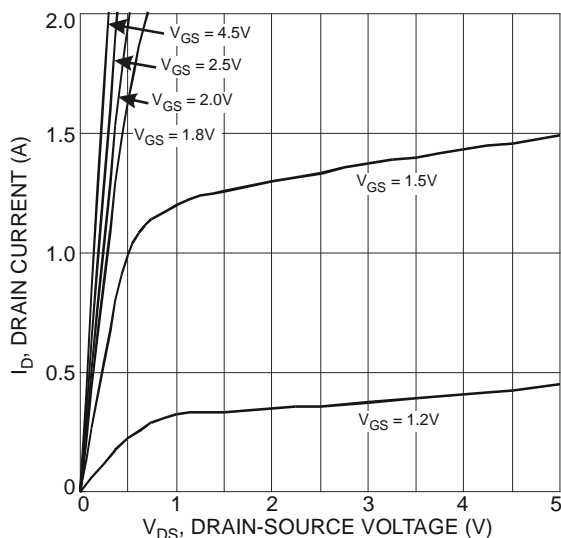


Fig. 3 Typical Output Characteristic

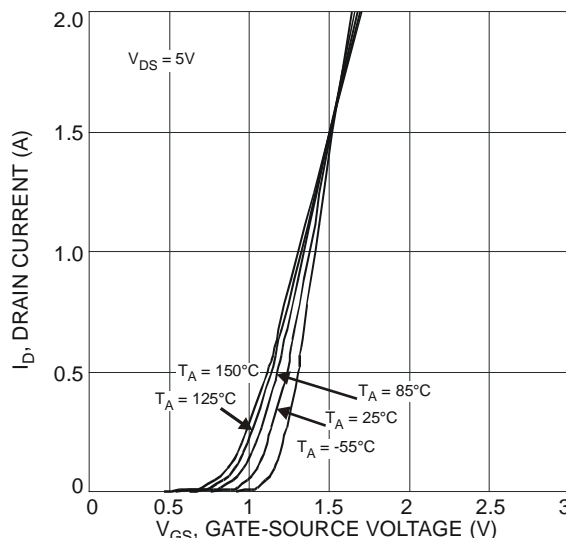


Fig. 4 Typical Transfer Characteristic

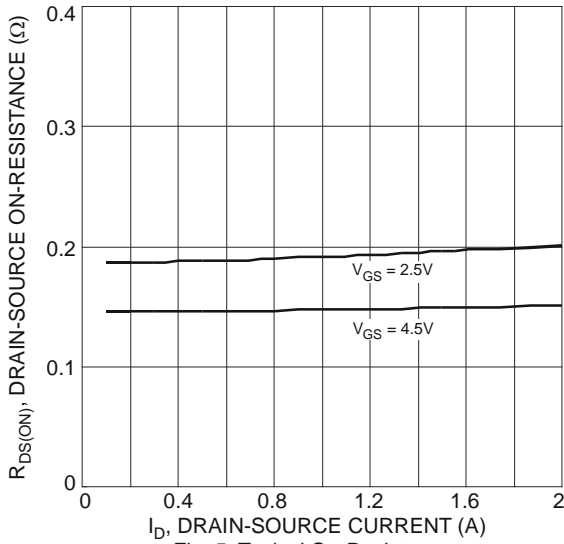


Fig. 5 Typical On-Resistance vs. Drain Current and Gate Voltage

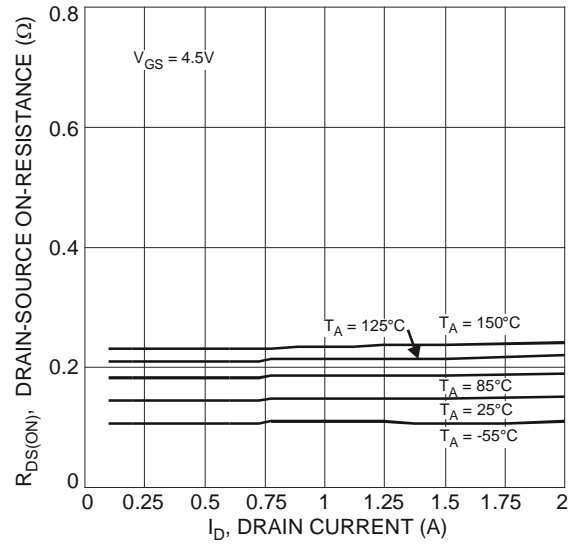


Fig. 6 Typical On-Resistance vs. Drain Current and Temperature

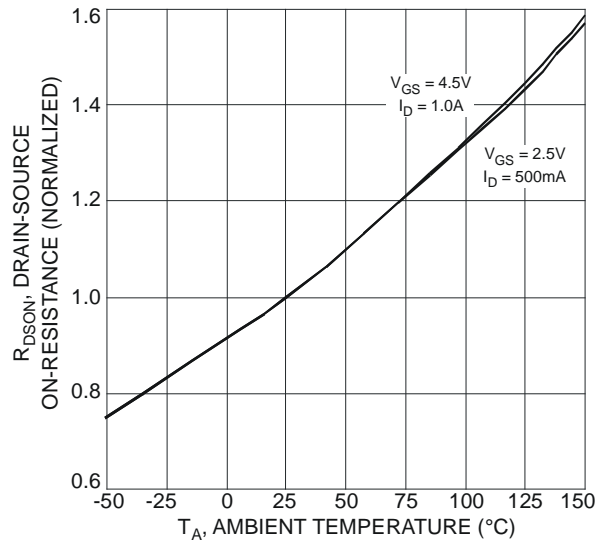


Fig. 7 On-Resistance Variation with Temperature

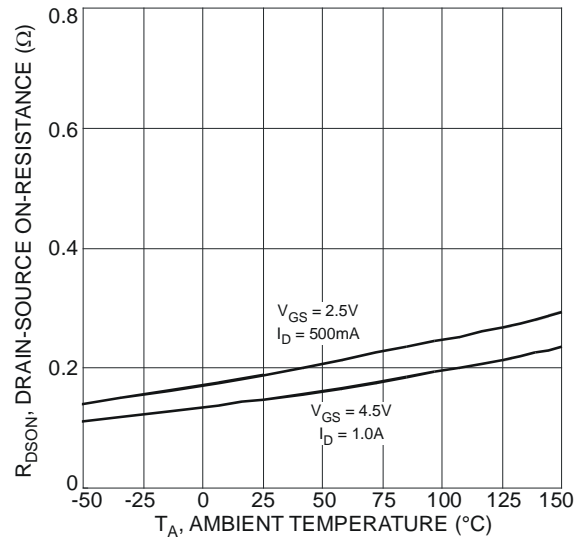


Fig. 8 On-Resistance Variation with Temperature

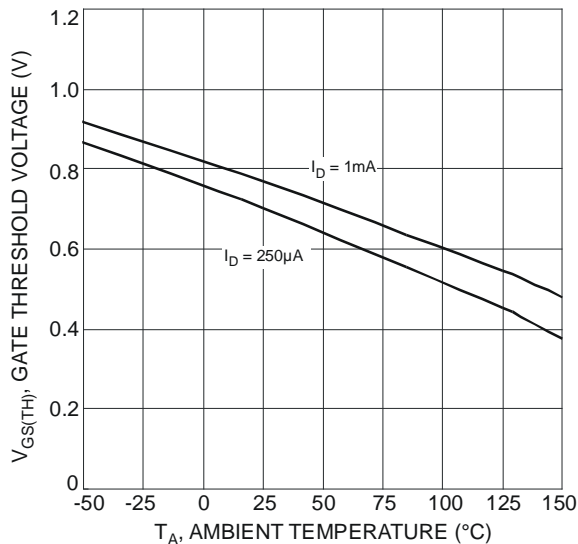


Fig. 9 Gate Threshold Variation vs. Ambient Temperature

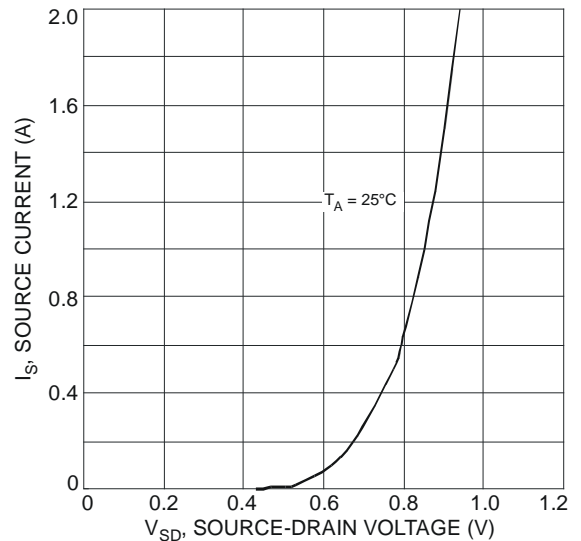
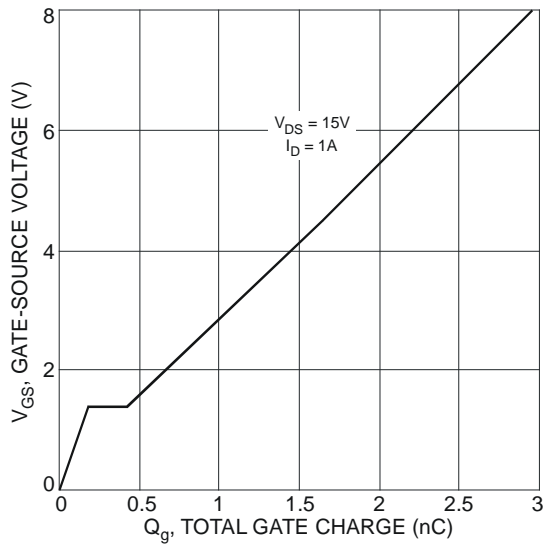
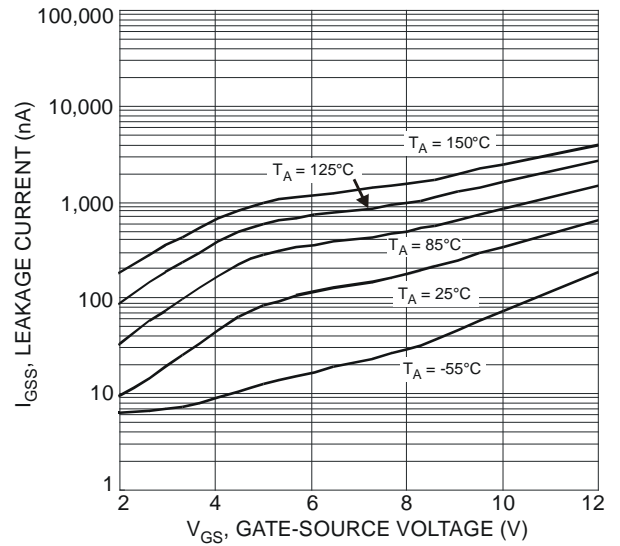
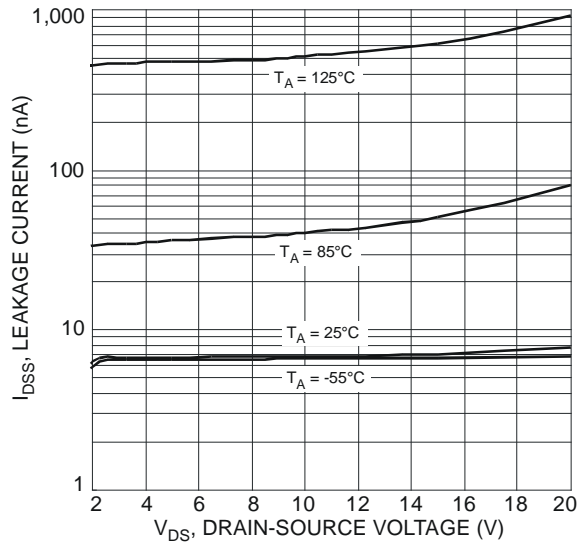
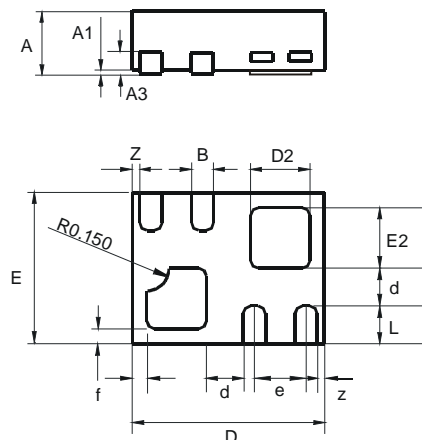


Fig. 10 Diode Forward Voltage vs. Current



## Package Outline Dimensions

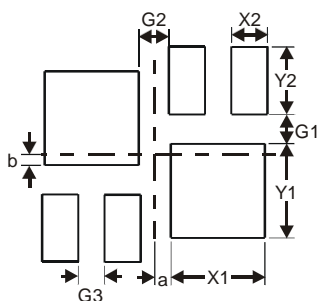
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



X2-DFN1310-6			
Dim	Min	Max	Typ
A	—	0.40	—
A1	0	0.05	0.02
A3	—	—	0.13
b	0.10	0.20	0.15
D	1.25	1.38	1.30
d	—	—	0.25
D2	0.30	0.50	0.40
E	0.95	1.075	1.00
e	—	—	0.35
E2	0.30	0.50	0.40
f	—	—	0.10
L	0.20	0.30	0.25
Z	—	—	0.05
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)
G1	0.16
G2	0.17
G3	0.15
X1	0.52
X2	0.20
Y1	0.52
Y2	0.375
a	0.09
b	0.06

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