

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on) \max}$	$I_D$ $T_A = +25^\circ\text{C}$
-20V	42.5m $\Omega$ @ $V_{GS} = -4.5\text{V}$	-4.0A
	71m $\Omega$ @ $V_{GS} = -1.8\text{V}$	-2.0A

## Description

This new generation 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.

## Applications

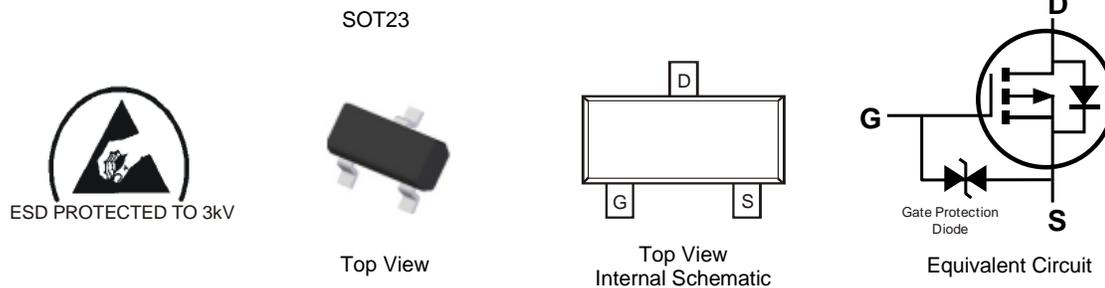
- DC-DC Converters
- Power Management Functions

## Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected Up To 3kV**
- **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: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe.
- Solderable per MIL-STD-202, Method 208  $\text{\textcircled{E3}}$
- Terminals Connections: See Diagram Below
- Weight: 0.008 grams (Approximate)



## Ordering Information (Note 4)

Part Number	Compliance	Case	Packaging
DMG3415U-7	Standard	SOT23	3,000/Tape & Reel
DMG3415UQ-7	Automotive	SOT23	3,000/Tape & Reel
DMG3415U-13	Standard	SOT23	10,000/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](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



34P = Product Type Marking Code  
 YM or  $\bar{Y}M$  = Date Code Marking for  
 Y or  $\bar{Y}$  = Year (ex: A = 2013)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2009	2010	2011	2012	2013	2014	2015
Code	W	X	Y	Z	A	B	C

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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	-20	V
Gate-Source Voltage			V <sub>GSS</sub>	±8	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	-4.0	A
		T <sub>A</sub> = +70°C		-3.5	
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I <sub>DM</sub>	-30	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	0.9	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	139	°C/W
Thermal Resistance, Junction to case (Note 5)	R <sub>θJC</sub>	32	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250µA
Zero Gate Voltage Drain Current	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> = ±8.0V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.3	-0.55	-1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	31	42.5	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4.0A
		—	40	53		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -3.5A
		—	51	71		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -2.0A
Forward Transfer Admittance	g <sub>Fs</sub>	—	3	—	S	V <sub>DS</sub> = -5V, I <sub>D</sub> = -4A
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	C <sub>iss</sub>	—	294	—	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	104	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	25	—	pF	
Gate Resistnace	R <sub>g</sub>	—	250	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
<b>SWITCHING CHARACTERISTICS (Note 7)</b>						
Total Gate Charge	Q <sub>g</sub>	—	9.1	—	nC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V I <sub>D</sub> = -4A
Gate-Source Charge	Q <sub>gs</sub>	—	1.5	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	1.7	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	71	—	ns	V <sub>DS</sub> = -10V, V <sub>GS</sub> = -4.5V, R <sub>D</sub> = 2.5Ω, R <sub>G</sub> = 3.0Ω, I <sub>D</sub> = -1A
Turn-On Rise Time	t <sub>r</sub>	—	117	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	795	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	393	—	ns	

- Notes:
- Device mounted on FR-4 substrate PC board, with minimum recommended pad layout.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

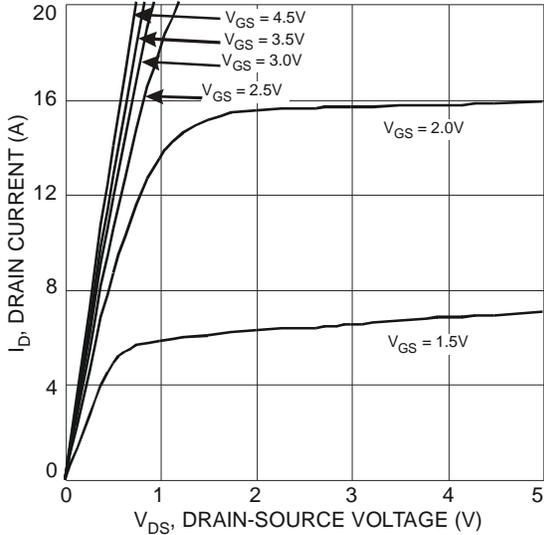


Fig. 1 Typical Output Characteristic

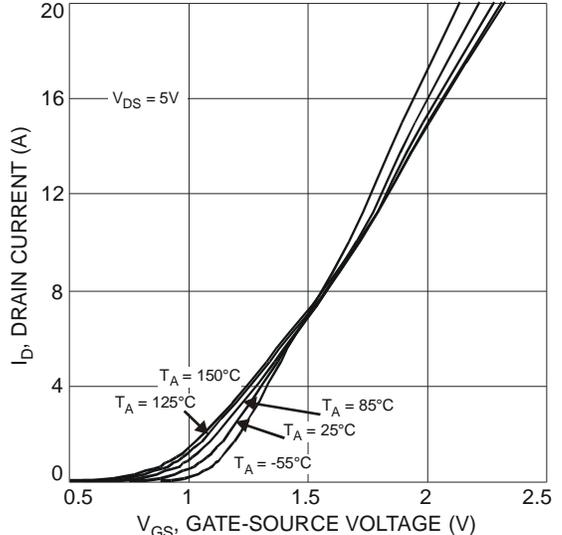


Fig. 2 Typical Transfer Characteristic

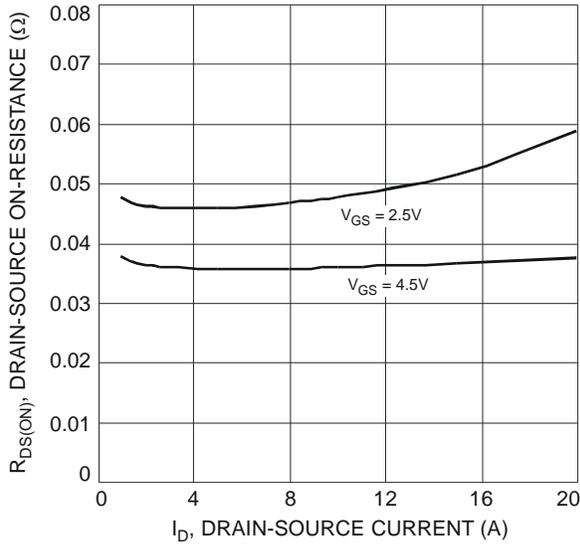


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

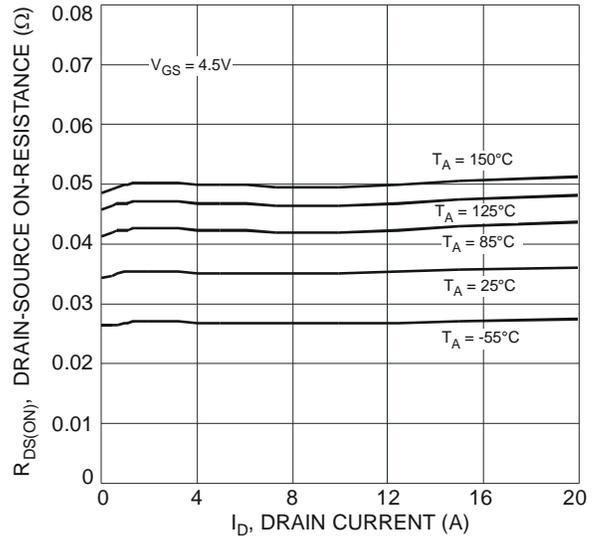


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

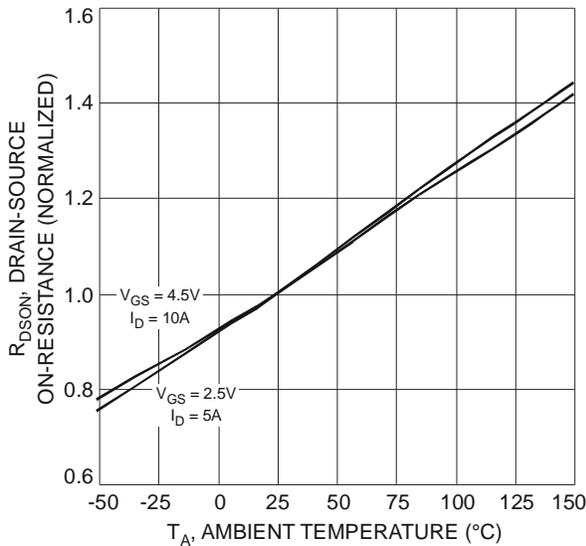


Fig. 5 On-Resistance Variation with Temperature

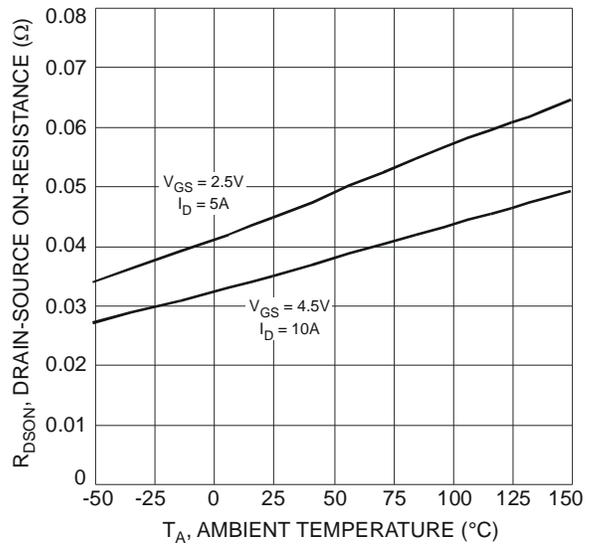


Fig. 6 On-Resistance Variation with Temperature

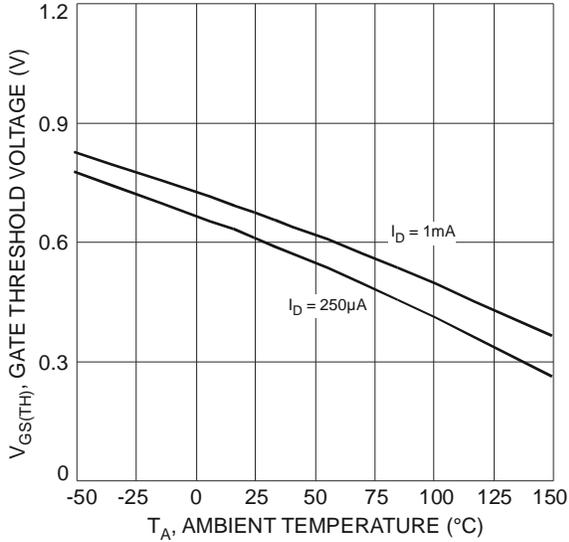


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

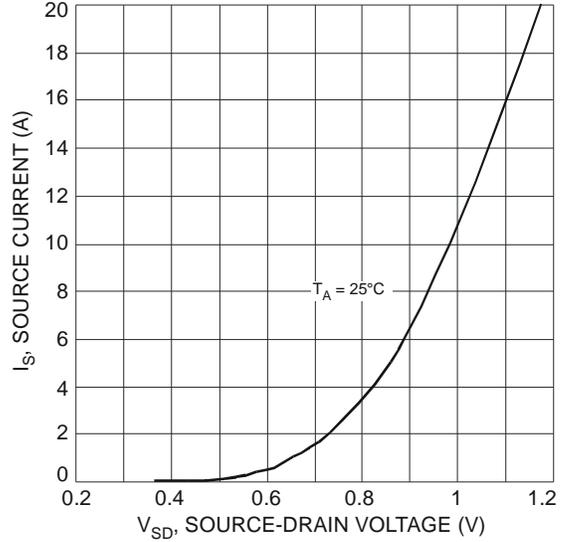


Fig. 8 Diode Forward Voltage vs. Current

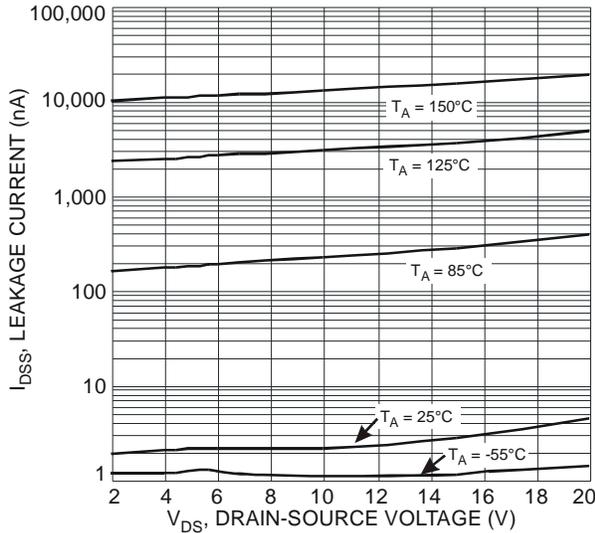


Fig. 9 Typical Leakage Current vs. Drain-Source Voltage

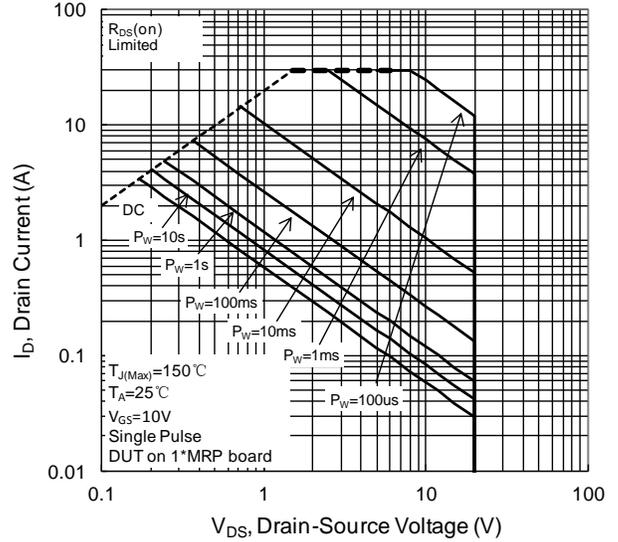


Fig. 10 SOA, Safe Operation Area

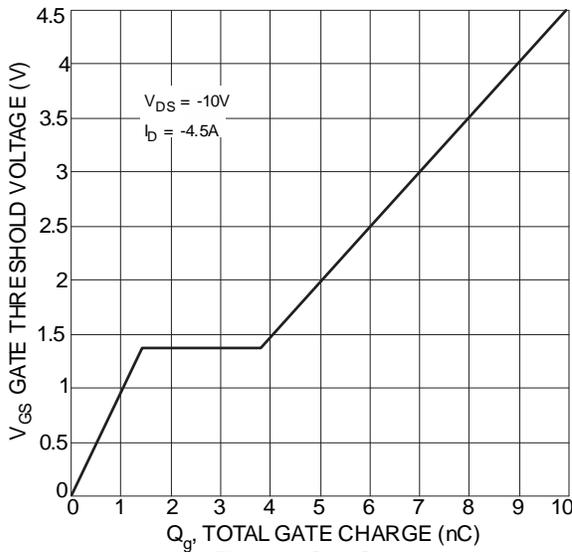


Figure 11 Gate Charge

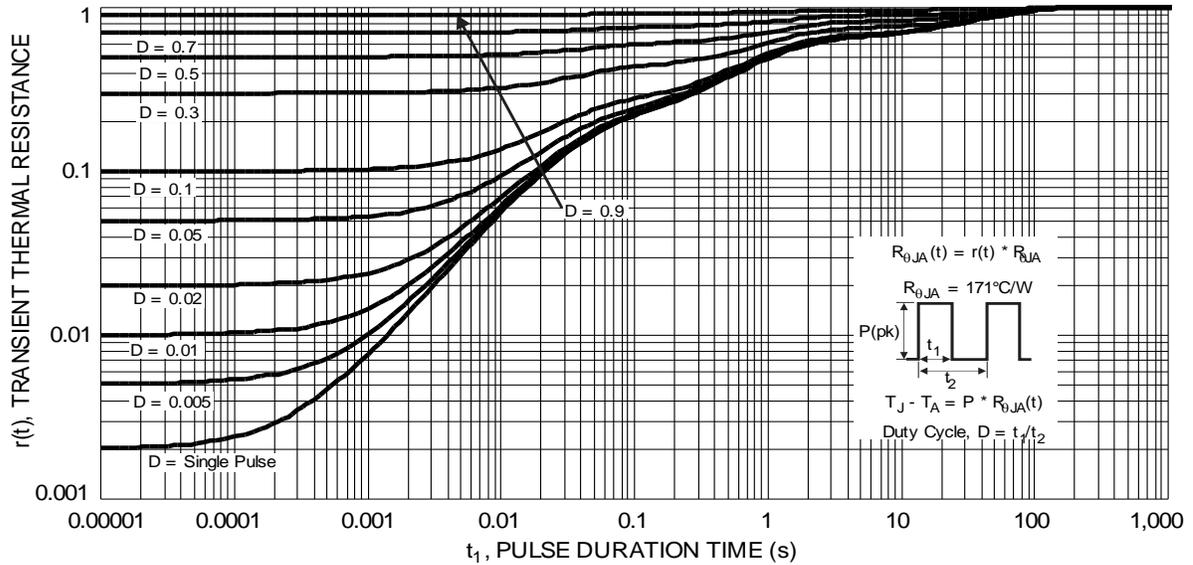
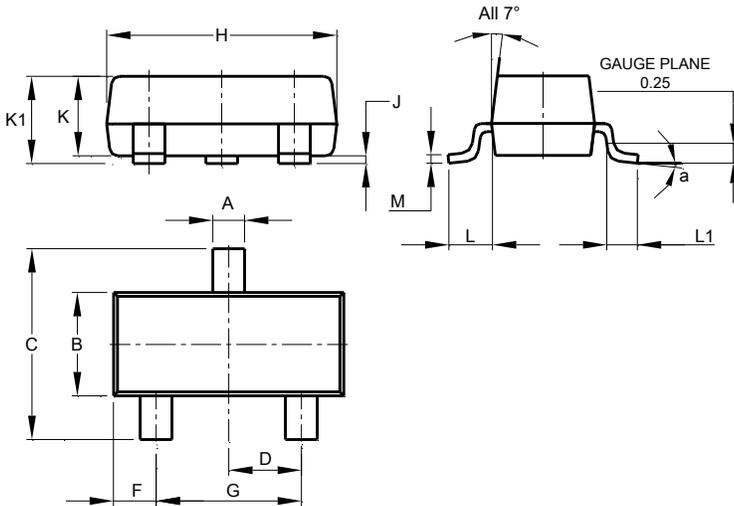


Figure 12 Transient Thermal Response

**Package Outline Dimensions**

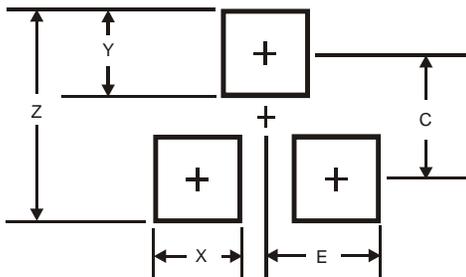
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	8°		
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)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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