

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ max	I_D $T_A = +25^\circ C$
-12V	31mΩ @ $V_{GS} = -4.5V$	-5.2A
	45mΩ @ $V_{GS} = -2.5V$	-4.3A

Description

This new generation MOSFET has been 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

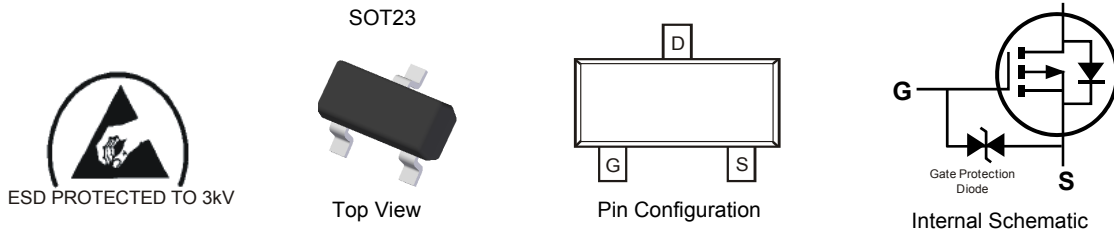
- DC-DC Converters
- Power management functions
- Analog Switch

Features and Benefits

- 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**
- **PPAP Capable (Note 4)**

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
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.0072 grams (approximate)

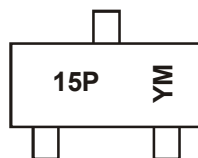


Ordering Information (Note 5)

Part Number	Compliance	Case	Packaging
DMP1045UQ-7	Automotive	SOT-23	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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_grade_definitions/.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



15P = Marking Code
 YM = Date Code Marking
 Y or = Year (ex: A = 2013)
 M = Month (ex: 9 = September)

Date Code Key

Year	2013	2014	2015	2016	2017	2018
Code	A	B	C	D	E	F

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 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-12	V
Gate-Source Voltage			V_{GSS}	± 8	V
Continuous Drain Current (Note 6) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	-4.0	A
		$T_A = +70^\circ\text{C}$		-3.1	
Continuous Drain Current (Note 6) $V_{GS} = -2.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	-3.3	A
		$T_A = +70^\circ\text{C}$		-2.6	
Continuous Drain Current (Note 7) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	-5.2	A
		$T_A = +70^\circ\text{C}$		-4.2	
Continuous Drain Current (Note 7) $V_{GS} = -2.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	-4.3	A
		$T_A = +70^\circ\text{C}$		-3.4	
Maximum Continuous Body Diode Forward Current (Note 7)			I_S	-2	A
Pulsed Drain Current (10 μs pulse, duty cycle=1%) (Note 6)			I_{DM}	-40	A

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 6)	P_D	0.8	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	168	$^\circ\text{C/W}$
Total Power Dissipation (Note 7)	P_D	1.3	W
Thermal Resistance, Junction to Ambient (Note 7)	$R_{\theta JA}$	99	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 7)	$R_{\theta JC}$	14.8	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	-12	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1.0	μA	$T_J = +25^\circ\text{C}, V_{DS} = -12\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 8\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.3	-0.55	-1.0	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	26	31	m Ω	$V_{GS} = -4.5\text{V}, I_D = -4.0\text{A}$
			31	45		$V_{GS} = -2.5\text{V}, I_D = -3.5\text{A}$
			45	75		$V_{GS} = -1.8\text{V}, I_D = -2.7\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	—	12	—	S	$V_{DS} = -5\text{V}, I_D = -4\text{A}$
Diode Forward Voltage	V_{SD}	—	-0.6	—	V	$V_{GS} = 0\text{V}, I_S = -1\text{A}$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1357	—	pF	$V_{DS} = -10\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	504	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	235	—	pF	
Gate Resistance	R_g	—	14.1	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
SWITCHING CHARACTERISTICS (Note 9)						
Total Gate Charge	Q_g	—	15.8	—	nC	$V_{GS} = -4.5\text{V}, V_{DS} = -10\text{V}, I_D = -4\text{A}$
Gate-Source Charge	Q_{gs}	—	2.0	—	nC	
Gate-Drain Charge	Q_{gd}	—	3.9	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	15.7	—	ns	$V_{DS} = -10\text{V}, V_{GS} = -4.5\text{V},$ $R_L = 2.5\Omega, R_G = 3.0\Omega$
Turn-On Rise Time	t_r	—	23.3	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	91.2	—	ns	
Turn-Off Fall Time	t_f	—	106.9	—	ns	

- Notes:
6. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 7. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate
 8. Short duration pulse test used to minimize self-heating effect.
 9. Guaranteed by design. Not subject to production testing.

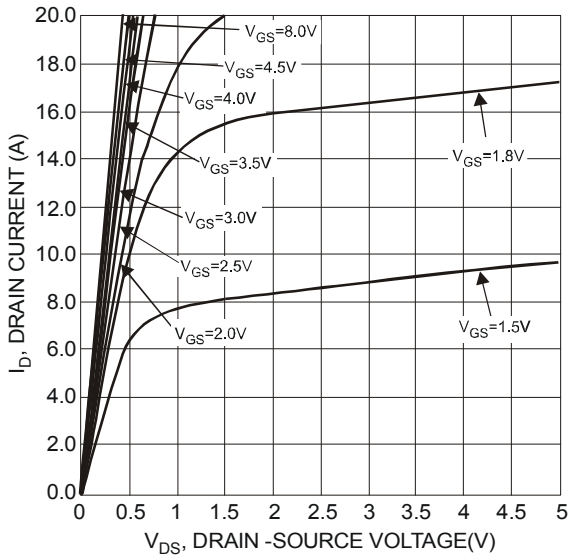


Fig. 1 Typical Output Characteristics

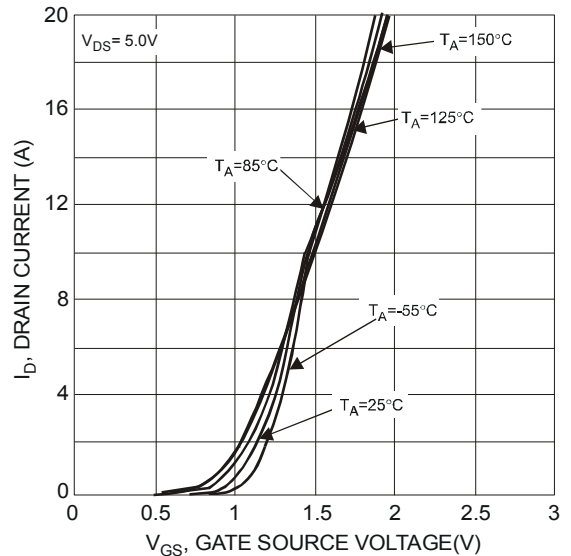


Fig. 2 Typical Transfer Characteristics

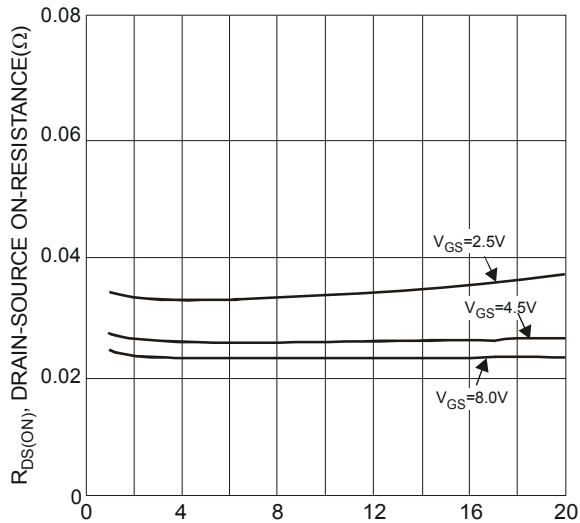


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

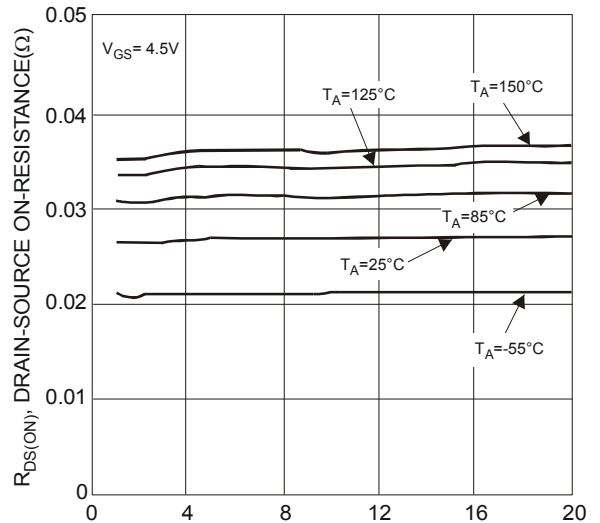


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

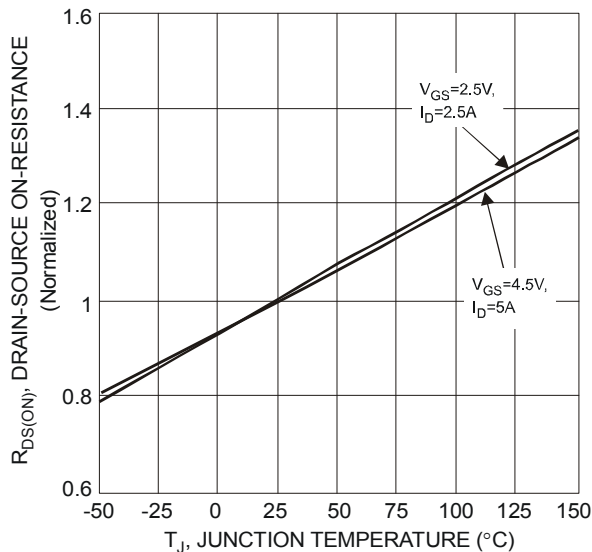


Fig. 5 On-Resistance Variation with Temperature

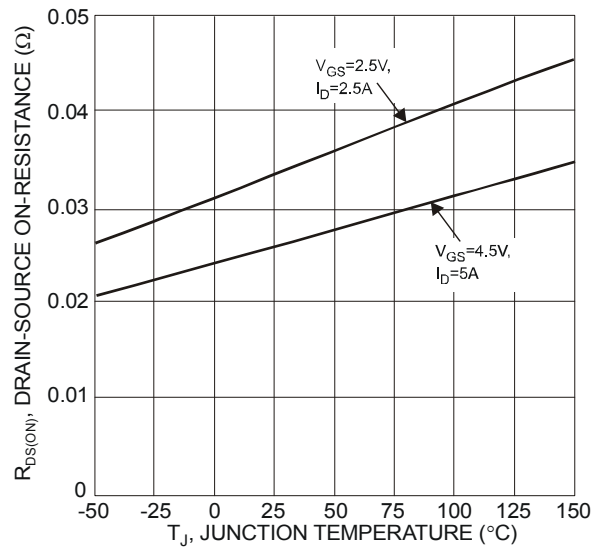


Fig. 6 On-Resistance Variation with Temperature

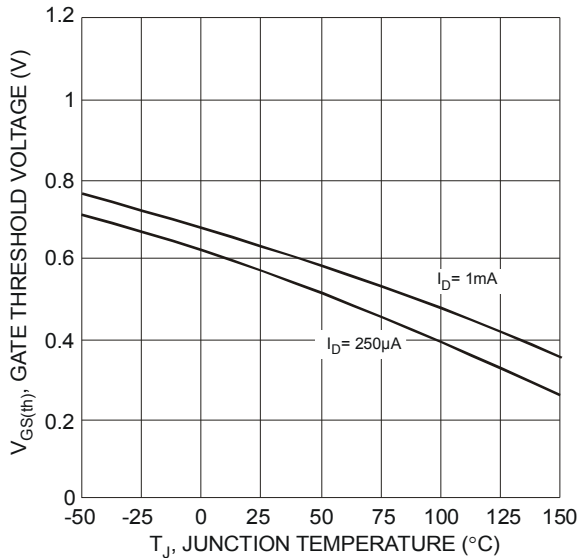


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

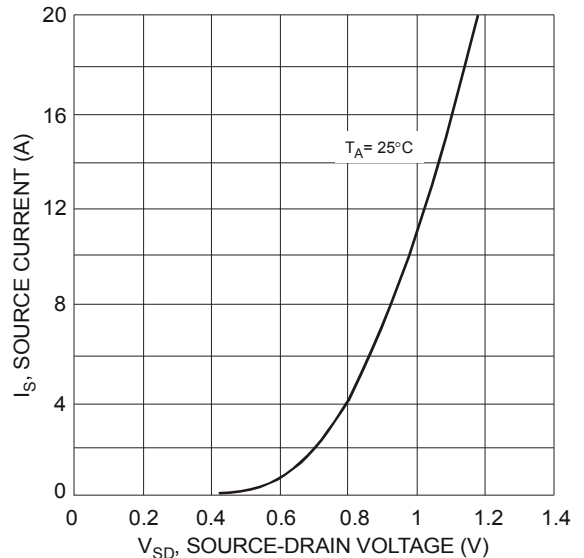


Fig. 8 Diode Forward Voltage vs. Current

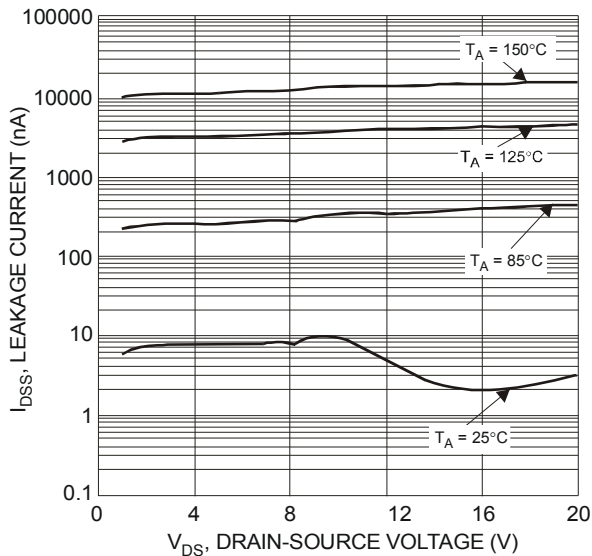


Fig. 9 Typical Drain-Source Leakage Current vs. Voltage

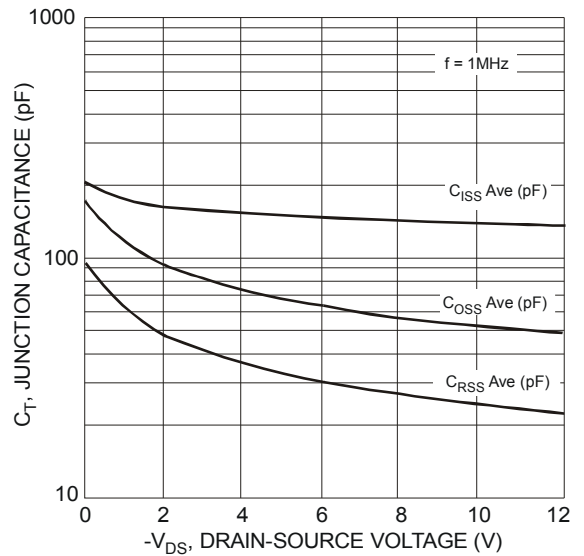


Fig. 10 Typical Junction Capacitance

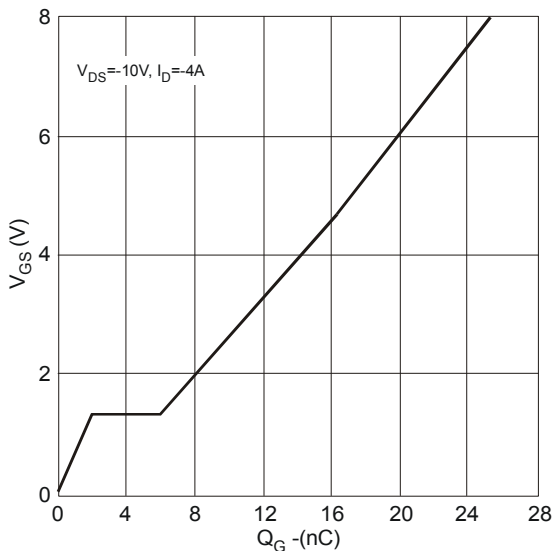
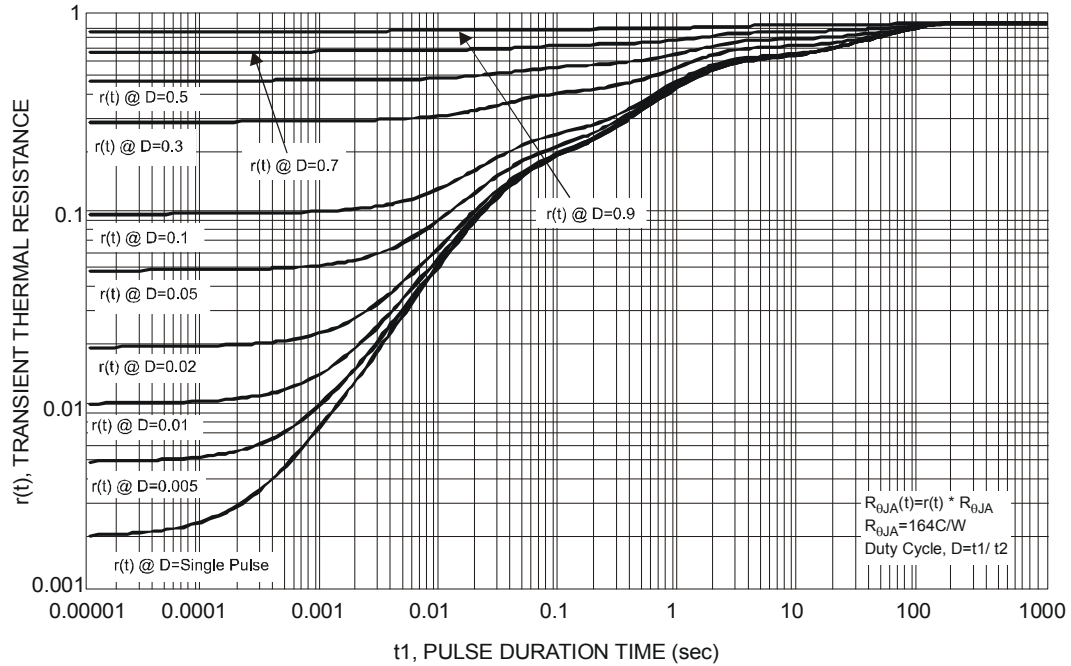
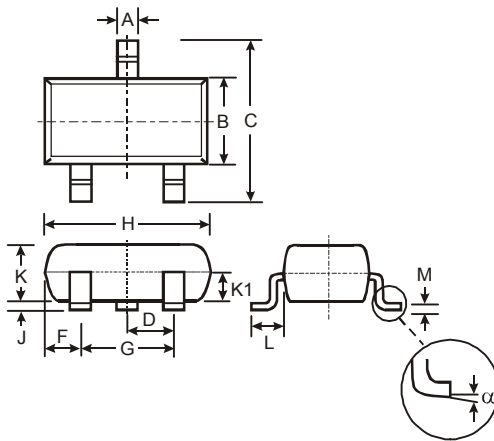


Fig. 11 Gate Charge Characteristics



Package Outline Dimensions

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

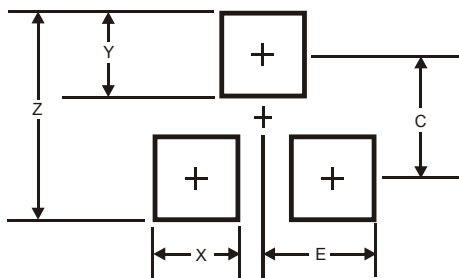


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	8°	-

All Dimensions in mm

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for 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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