

**DMN6068SE**
**60V N-CHANNEL ENHANCEMENT MODE MOSFET**
**Product Summary**

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$ $T_A = +25^\circ C$
60V	68m $\Omega$ @ $V_{GS} = 10V$	5.6A
	100m $\Omega$ @ $V_{GS} = 4.5V$	4.7A

**Description**

This MOSFET has been designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

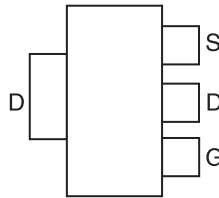
**Applications**

- Motor Control
- Transformer Driving Switch
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply

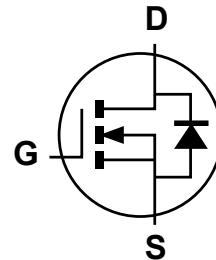
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

**Features and Benefits**

- 100% Unclamped Inductive Switch (UIS) test in production
- Low on-resistance
- Fast switching speed
- **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**

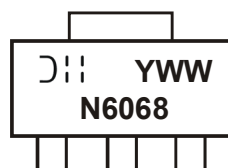
**Mechanical Data**

- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound.  
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin annealed over Copper lead frame.  
Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.112 grams (approximate)

**Ordering Information** (Note 4 & 5)

Part Number	Qualification	Case	Packaging
DMN6068SE-13	Standard	SOT223	4000 / Tape & Reel
DMN6068SEQ-13	Automotive	SOT223	4000 / 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>.
  5. 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/](http://www.diodes.com/quality/product_grade_definitions/).

**Marking Information**


011 = Manufacturer's Marking  
 N6068 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y = Year (ex: 9 = 2009)  
 WW = Week (01 - 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source voltage			V <sub>DSS</sub>	60	V
Gate-Source voltage	(Note 6)		V <sub>GS</sub>	±20	V
Single Pulsed Avalanche Energy	(Note 11)		E <sub>AS</sub>	37.5	mJ
Single Pulsed Avalanche Current	(Note 11)		I <sub>AS</sub>	5.0	A
Continuous Drain current	V <sub>GS</sub> = 10V	(Note 8)	I <sub>D</sub>	5.6	A
		T <sub>A</sub> = +70°C (Note 8)		4.5	
		(Note 7)		4.1	
Pulsed Drain current	V <sub>GS</sub> = 10V	(Note 9)	I <sub>DM</sub>	20.8	A
Continuous Source current (Body diode)		(Note 8)	I <sub>S</sub>	4.9	A
Pulsed Source current (Body diode)		(Note 9)	I <sub>SM</sub>	20.8	A

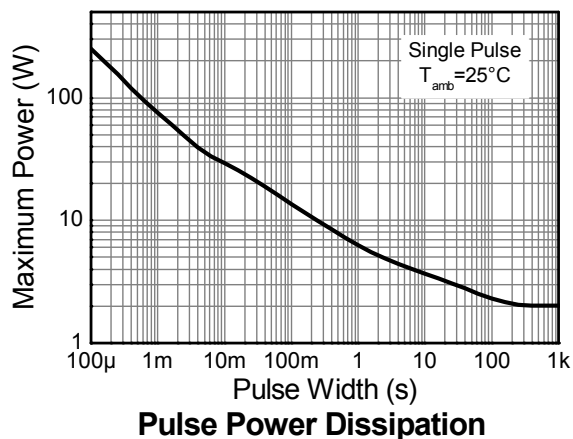
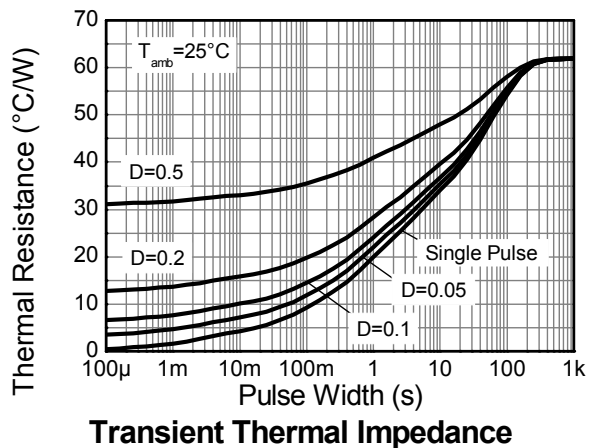
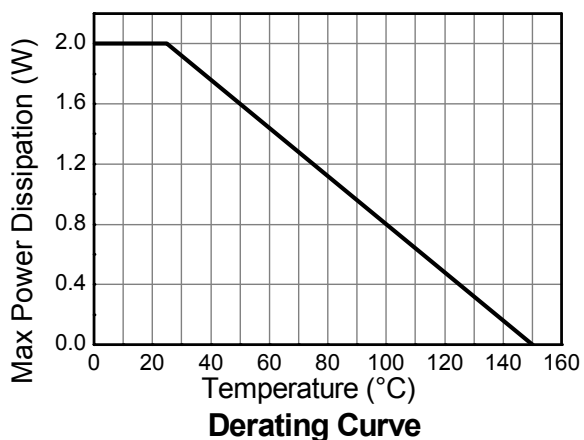
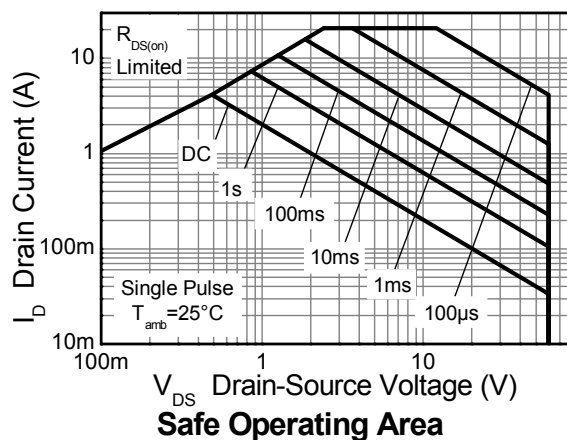
## Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Note 7)	P <sub>D</sub>	2.0 16.0	W mW/°C
	(Note 8)		3.7 29.5	
Thermal Resistance, Junction to Ambient	(Note 7)	R <sub>θJA</sub>	62.5	°C/W
	(Note 8)		34	
Thermal Resistance, Junction to Lead	(Note 10)	R <sub>θJL</sub>	11.5	
Operating and storage temperature range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

Notes:

6. AEC-Q101 V<sub>GS</sub> maximum is ±16V.
7. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
8. Same as note (3), except the device is measured at t ≤ 10 sec.
9. Same as note (3), except the device is pulsed with D= 0.02 and pulse width 300μs. The pulse current is limited by the maximum junction temperature.
10. Thermal resistance from junction to solder-point (at the end of the drain lead).
11. UIS in production with L = 3.0mH, I<sub>AS</sub> = 5.0A, R<sub>G</sub> = 25Ω, V<sub>DD</sub>=50V, starting T<sub>J</sub> = +25°C.

## Thermal Characteristics

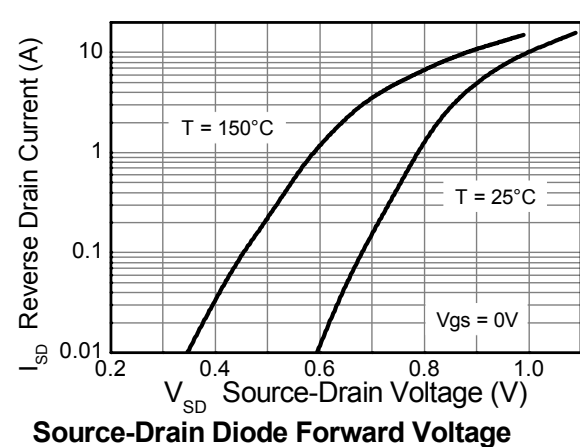
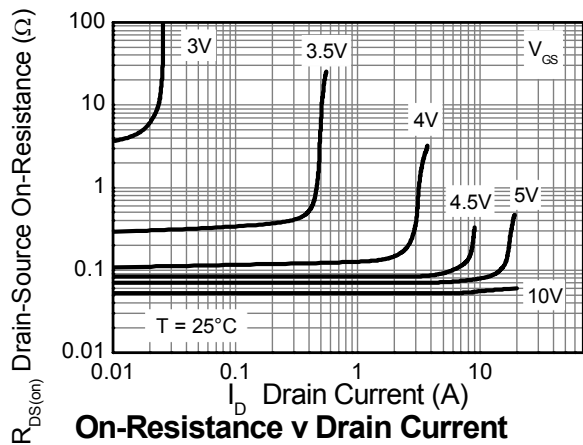
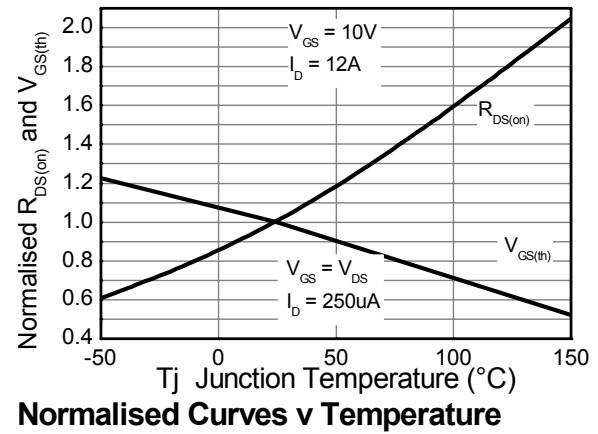
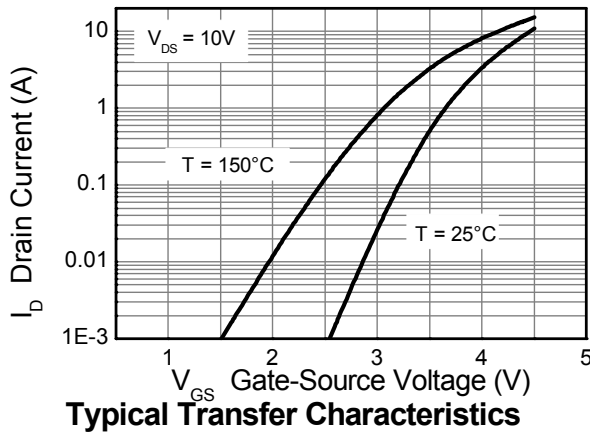
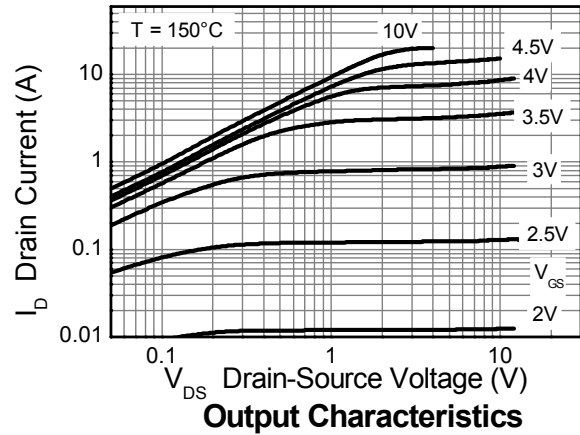
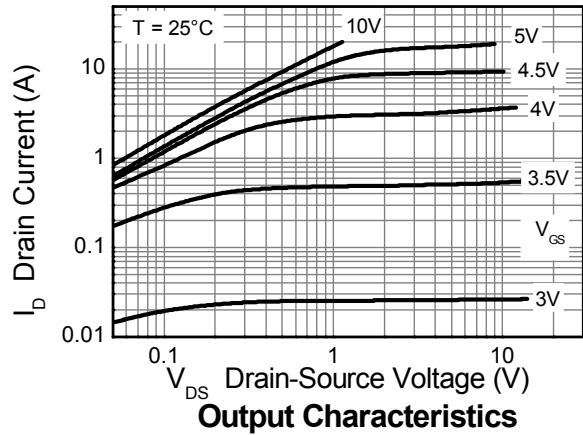


# Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

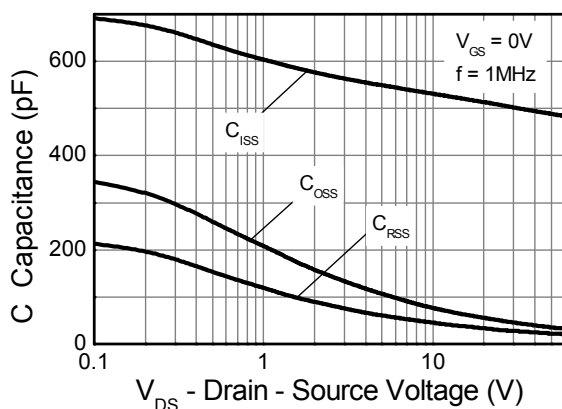
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	—	—	V	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	0.5	μA	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V	
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	
ON CHARACTERISTICS							
Gate Threshold Voltage	V <sub>GS(th)</sub>	1.0	—	3.0	V	I <sub>D</sub> = 250μA, V <sub>DS</sub> = V <sub>GS</sub>	
Static Drain-Source On-Resistance (Note 12)	R <sub>DS (ON)</sub>	—	—	0.068	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 12A	
				0.100		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6A	
Forward Transconductance (Notes 12 & 13)	g <sub>fs</sub>	—	19.7	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 12A	
Diode Forward Voltage (Note 12)	V <sub>SD</sub>	—	0.98	1.15	V	I <sub>S</sub> = 12A, V <sub>GS</sub> = 0V	
Reverse recovery time (Note 13)	t <sub>rr</sub>		145	—	ns	I <sub>S</sub> = 12A, di/dt= 100A/μs	
Reverse recovery charge (Note 13)	Q <sub>rr</sub>	—	929	—	nC		
DYNAMIC CHARACTERISTICS (Note 13)							
Input Capacitance	C <sub>iss</sub>	—	502	—	pF	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V f= 1MHz	
Output Capacitance	C <sub>oss</sub>	—	45.7	—	pF		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	27.1	—	pF		
Total Gate Charge (Note 14)	Q <sub>g</sub>	—	5.55	—	nC	V <sub>GS</sub> = 4.5V	V <sub>DS</sub> = 30V I <sub>D</sub> = 12A
Total Gate Charge (Note 14)	Q <sub>g</sub>	—	10.3	—	nC	V <sub>GS</sub> = 10V	
Gate-Source Charge (Note 14)	Q <sub>gs</sub>	—	1.6	—	nC		
Gate-Drain Charge(Note 14)	Q <sub>gd</sub>	—	3.5	—	nC		
Turn-On Delay Time (Note 14)	t <sub>D(on)</sub>	—	3.6	—	ns	V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V I <sub>D</sub> = 12A, R <sub>G</sub> ≡ 6.0Ω	
Turn-On Rise Time (Note 14)	t <sub>r</sub>	—	10.8	—	ns		
Turn-Off Delay Time (Note 14)	t <sub>D(off)</sub>	—	11.9	—	ns		
Turn-Off Fall Time (Note 14)	t <sub>f</sub>	—	8.7	—	ns		

Notes: 12. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%  
13. For design aid only, not subject to production testing.  
14. Switching characteristics are independent of operating junction temperatures.

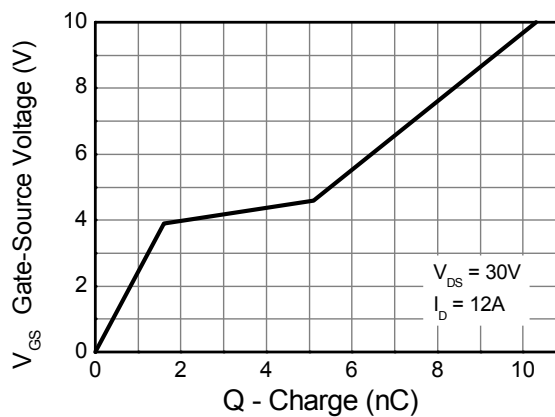
## Typical Characteristics



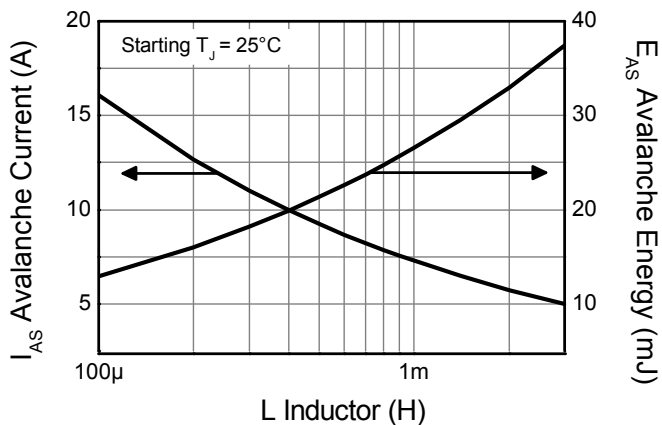
## Typical Characteristics (cont.)



Capacitance v Drain-Source Voltage

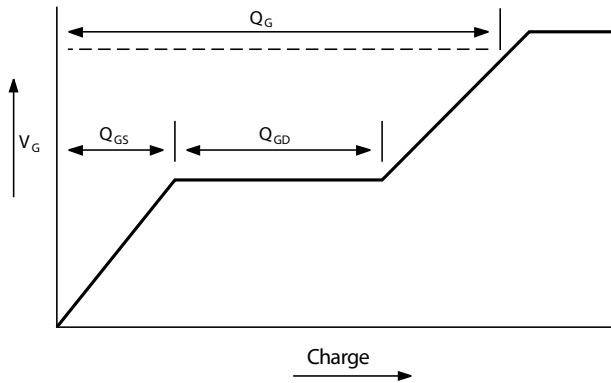


Gate-Source Voltage v Gate Charge

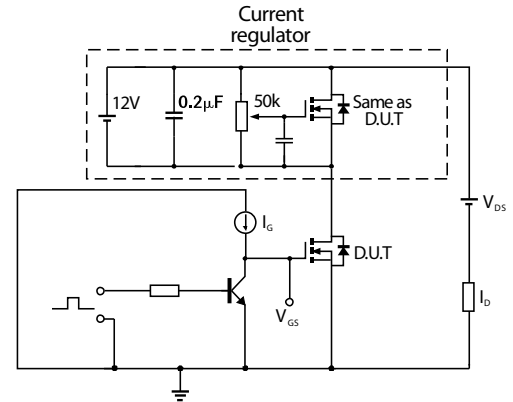


Single-Pulsed Avalanche Rating

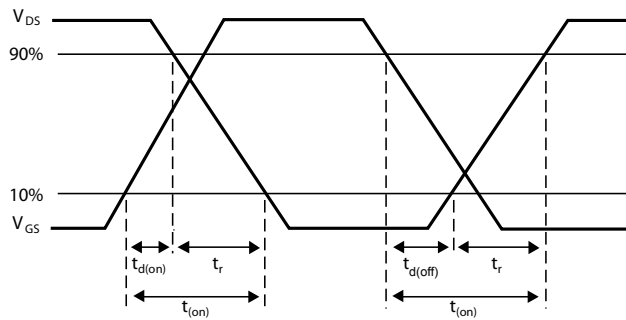
## Test Circuits



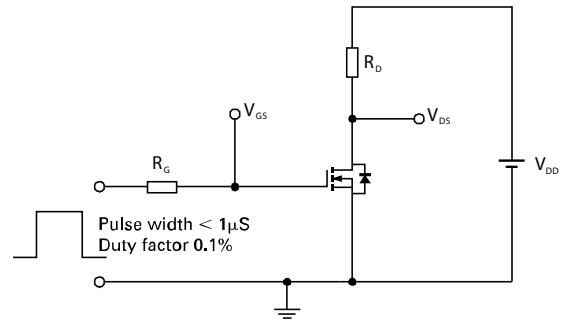
**Basic gate charge waveform**



**Gate charge test circuit**



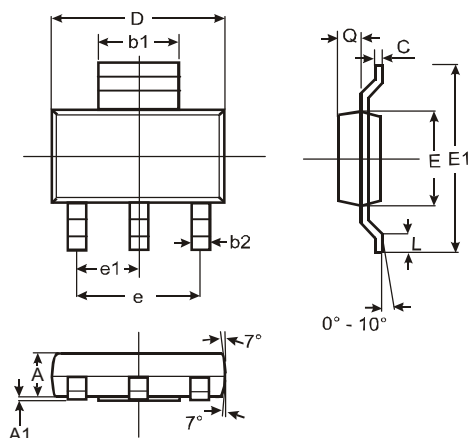
**Switching time waveforms**



**Switching time test circuit**

## Package Outline Dimensions

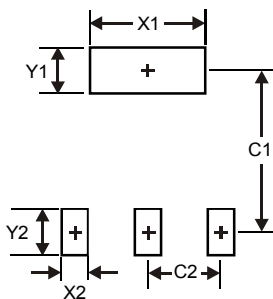
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b1	2.90	3.10	3.00
b2	0.60	0.80	0.70
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	—	—	4.60
e1	—	—	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
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)
X1	3.3
X2	1.2
Y1	1.6
Y2	1.6
C1	6.4
C2	2.3



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