

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | I_D $T_A = +25^\circ\text{C}$ |
|---------------|-------------------------------|------------------------------------|
| 40V | 0.05Ω @ $V_{GS} = 10\text{V}$ | 7A |

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.

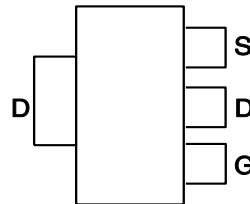
Applications

- DC-DC Converters
- Audio Output Stages
- Relay and Solenoid Driving
- Motor Control

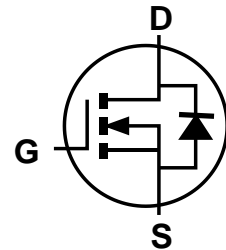
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

Features

- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive
- **Lead-Free Finish; 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, 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 **e3**
- Weight: 0.112 grams (Approximate)

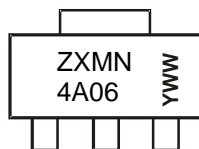
Ordering Information (Note 4)

| Part Number | Compliance | Case | Packaging |
|-------------|------------|--------|-------------------|
| ZXMN4A06GTA | Standard | SOT223 | 1,000/Tape & Reel |

- Note:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information

SOT223



ZXMN 4A06 = Product Type Marking Code
 YWW = Date Code Marking
 Y or \bar{Y} = Last Digit of Year (ex: 5= 2015)
 WW or $\bar{W}W$ = Week Code (01-53)

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

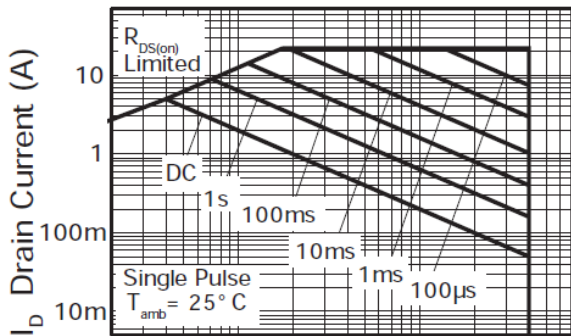
| Characteristic | | | Symbol | Value | Unit | |
|--|-----------------------|---------------------------------|------------------|-----------------|------|---|
| Drain-Source Voltage | | | V _{DSS} | 40 | V | |
| Gate-Source Voltage | | | V _{GS} | ±20 | V | |
| Continuous Drain Current | V _{GS} = 10V | (Note 6) | I _D | 7 | A | |
| | | T _A = +70°C (Note 6) | | 5.6 | | |
| | | (Note 5) | | 5 | | |
| Pulsed Drain Current | V _{GS} = 10V | (Note 7) | I _{DM} | 22 | A | |
| Continuous Source Current (Body Diode) | | | (Note 6) | I _S | 5.4 | A |
| Pulsed Source Current (Body Diode) | | | (Note 7) | I _{SM} | 22 | A |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

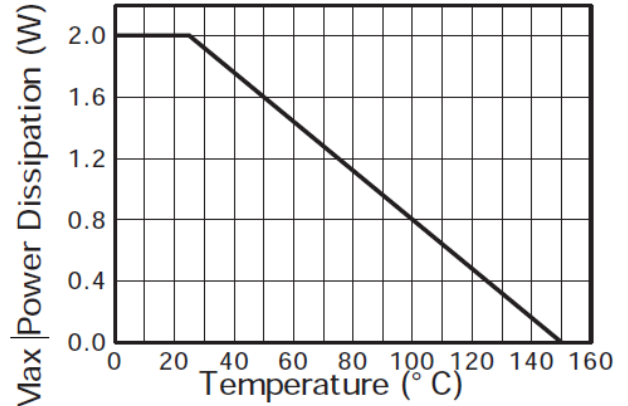
| Characteristic | | Symbol | Value | Unit | |
|---|------------------------|-----------------------------------|-----------------------------------|-------------|----|
| Power Dissipation | (Note 5) | P _D | 2 | W | |
| | Linear Derating Factor | | 16 | | |
| Thermal Resistance, Junction to Ambient | (Note 6) | R _{θJA} | 3.9 | mW/°C | |
| | (Note 7) | | 31 | | |
| Operating and Storage Temperature Range | (Note 6) | T _J , T _{STG} | 62.5 | °C/W | |
| | (Note 7) | | 32.2 | | |
| Operating and Storage Temperature Range | | | T _J , T _{STG} | -55 to +150 | °C |

Notes: 5. For a device surface mounted on 25mm x 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
 6. For a device surface mounted on FR-4 PCB measured at t ≤ 5 seconds.
 7. Repetitive rating 25mm x 25mm FR4 PCB, D = 0.05, pulse width 10µs - pulse width limited by maximum junction temperature.

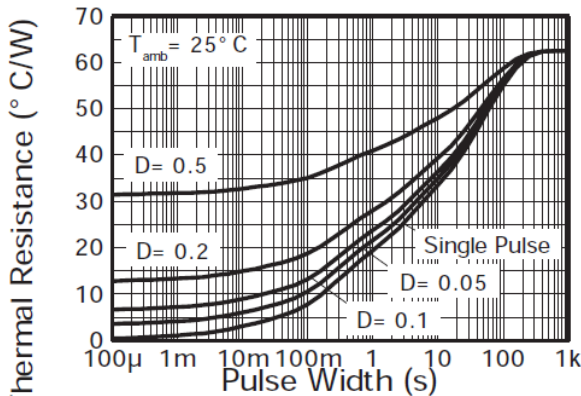
Thermal Characteristics



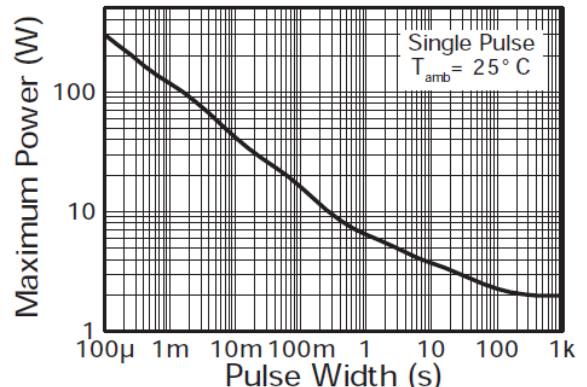
Safe Operating Area



Derating Curve



Transient Thermal Impedance



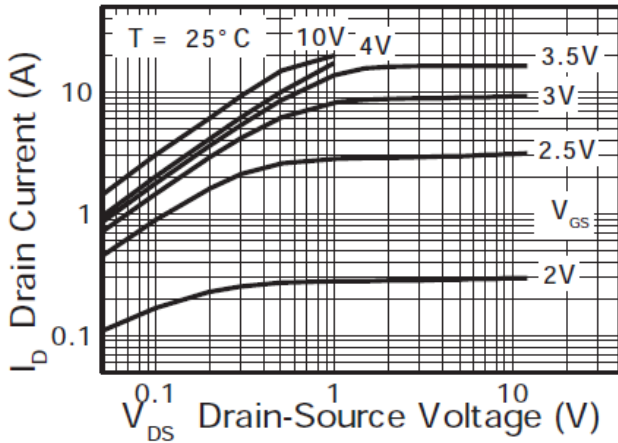
Pulse Power Dissipation

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

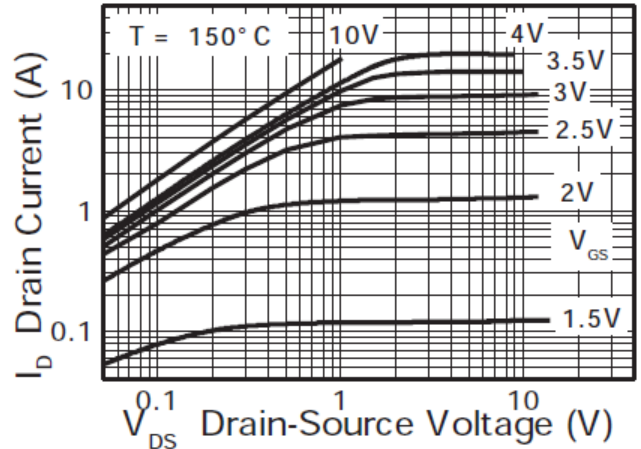
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|-----|-------|-------|------|---|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 40 | — | — | V | I _D = 250μA, V _{GS} = 0V |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | μA | V _{DS} = 40V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | 1 | — | 2 | V | I _D = 250μA, V _{DS} = V _{GS} |
| Static Drain-Source On-Resistance (Note 9) | R _{DS(on)} | — | — | 0.05 | Ω | V _{GS} = 10V, I _D = 4.5A |
| | | | | 0.075 | | V _{GS} = 4.5V, I _D = 3.2A |
| Forward Transconductance (Notes 11) | g _{fs} | — | 8.7 | — | S | V _{DS} = 15V, I _D = 2.5A |
| Diode Forward Voltage (Note 9) | V _{SD} | — | 0.8 | 0.95 | V | I _S = 2.5A, V _{GS} = 0V, T _J = +25°C |
| Reverse Recovery Time (Note 11) | t _{rr} | — | 19.86 | — | ns | I _F = 2.5A, di/dt = 100A/μs, |
| Reverse Recovery Charge (Note 11) | Q _{rr} | — | 16.36 | — | nC | T _J = +25°C |
| DYNAMIC CHARACTERISTICS (Note 10) | | | | | | |
| Input Capacitance | C _{iSS} | — | 770 | — | pF | V _{DS} = 40V, V _{GS} = 0V f = 1MHz |
| Output Capacitance | C _{oss} | — | 92 | — | pF | |
| Reverse Transfer Capacitance | C _{rSS} | — | 61 | — | pF | |
| Total Gate Charge (Note 11) | Q _g | — | 18.2 | — | nC | V _{DS} = 30V, V _{GS} = 10V, I _D = 2.5A (refer to test circuit) |
| Gate-Source Charge (Note 11) | Q _{gs} | — | 2.1 | — | nC | |
| Gate-Drain Charge (Note 11) | Q _{gd} | — | 4.5 | — | nC | |
| Turn-On Delay Time (Note 11) | t _{D(on)} | — | 2.55 | — | ns | V _{DD} = 30V, V _{GS} = 10V I _D = 2.5A, R _G = 6Ω (refer to test circuit) |
| Turn-On Rise Time (Note 11) | t _r | — | 4.45 | — | ns | |
| Turn-Off Delay Time (Note 11) | t _{D(off)} | — | 28.61 | — | ns | |
| Turn-Off Fall Time (Note 11) | t _f | — | 7.35 | — | ns | |

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

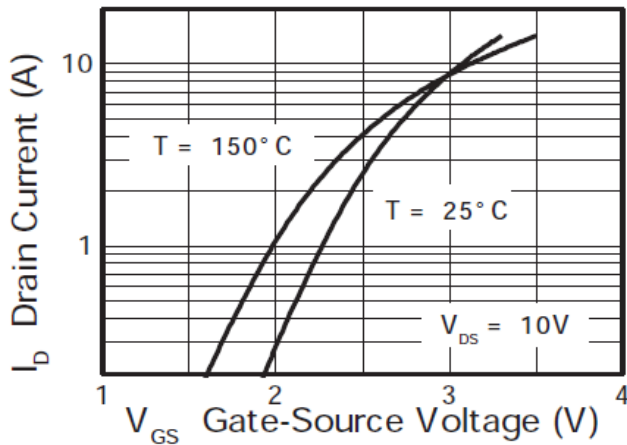
Typical Characteristics



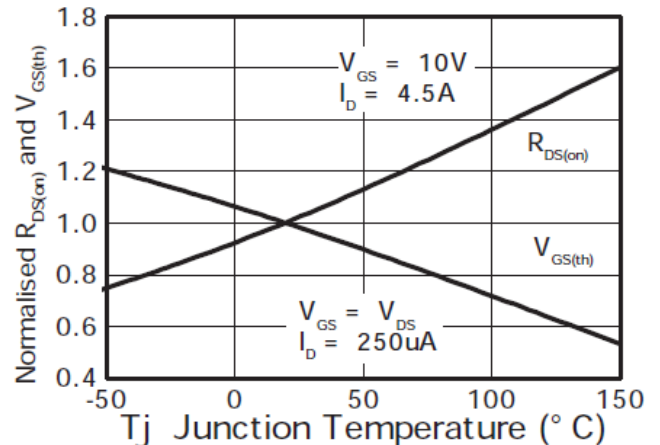
Output Characteristics



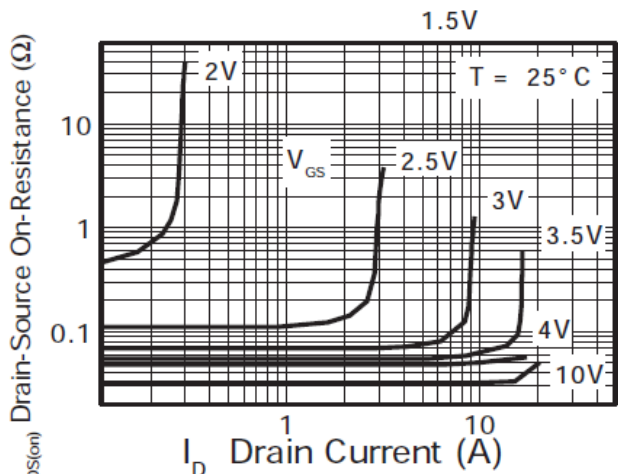
Output Characteristics



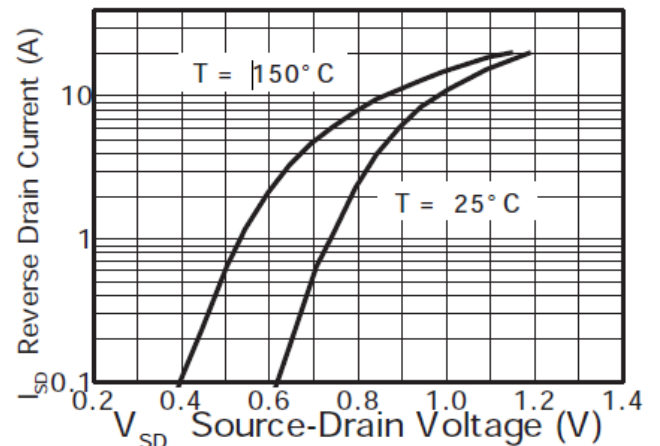
Typical Transfer Characteristics



Normalised Curves v Temperature

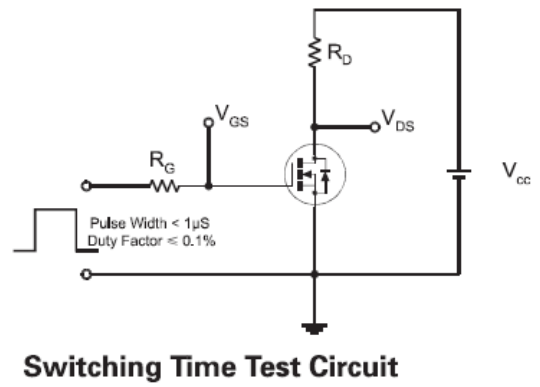
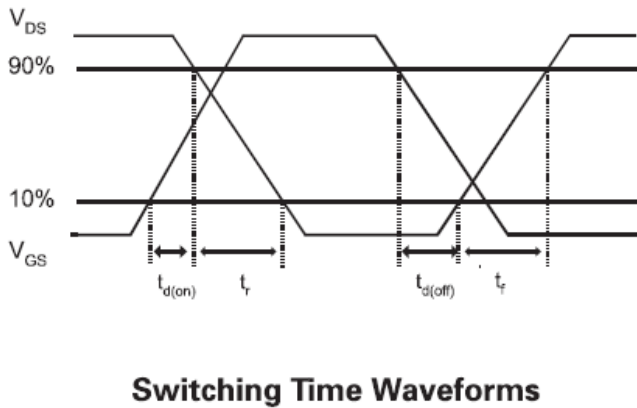
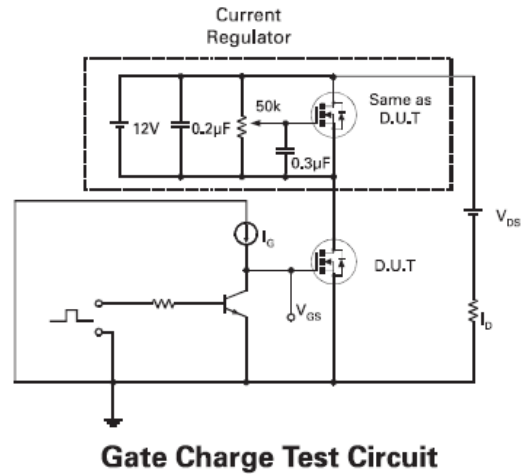
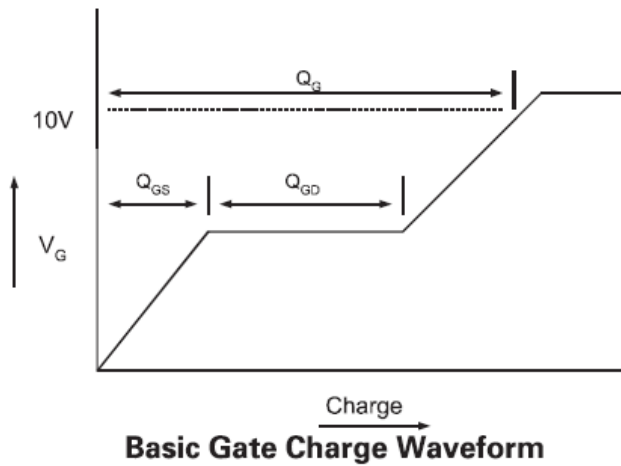
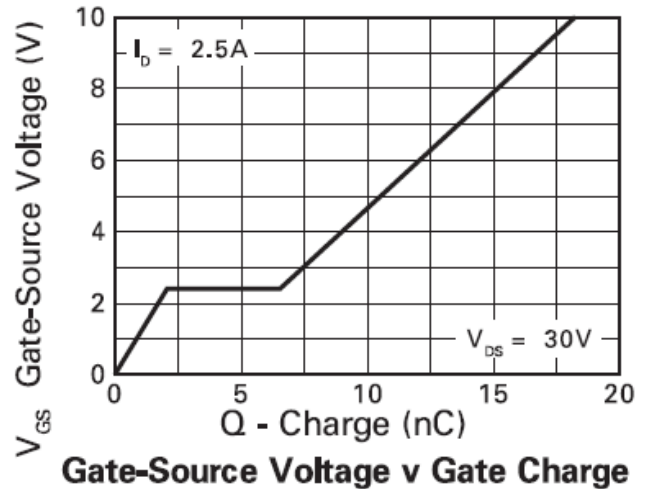
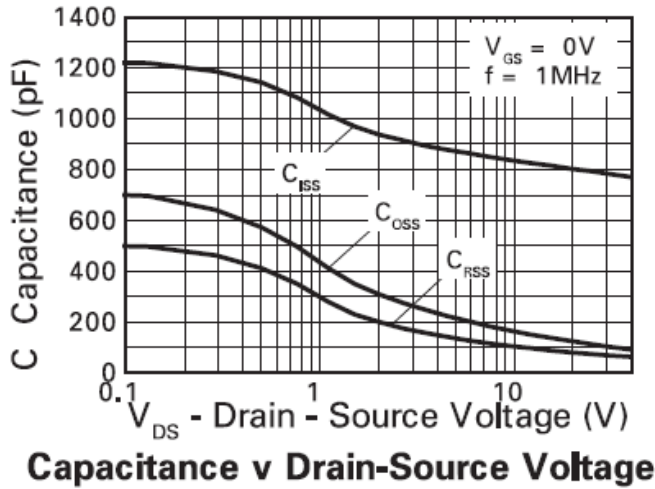


On-Resistance v Drain Current



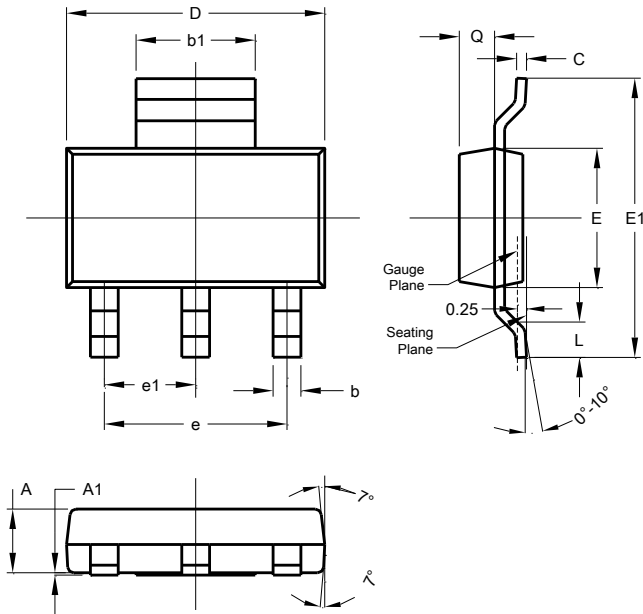
Source-Drain Diode Forward Voltage

Typical Characteristics (cont.)



Package Outline Dimensions

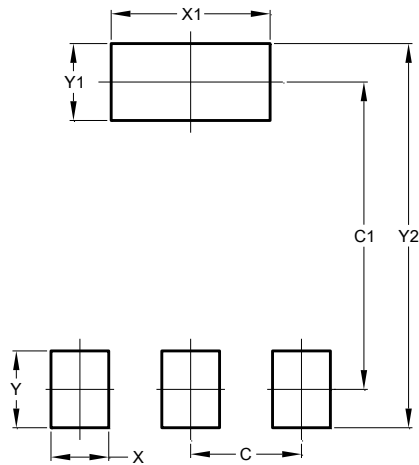
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SOT223 | | | |
|----------------------|-------|------|------|
| Dim | Min | Max | Typ |
| A | 1.55 | 1.65 | 1.60 |
| A1 | 0.010 | 0.15 | 0.05 |
| b | 0.60 | 0.80 | 0.70 |
| b1 | 2.90 | 3.10 | 3.00 |
| 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) |
|------------|---------------|
| C | 2.30 |
| C1 | 6.40 |
| X | 1.20 |
| X1 | 3.30 |
| Y | 1.60 |
| Y1 | 1.60 |
| Y2 | 8.00 |

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