

20V N-CHANNEL ENHANCEMENT MODE MOSFET
Product Summary

| | | |
|---------------|-------------------------------|------------------------------------|
| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | I_D $T_A = +25^\circ\text{C}$ |
| 20V | 0.12Ω @ $V_{GS} = 10\text{V}$ | 2.2A |

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
- Motor Control

Features

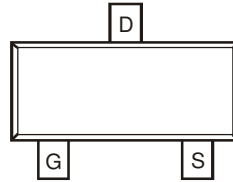
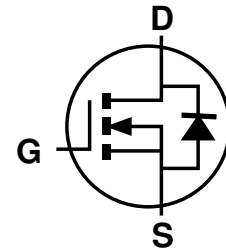
- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive
- Small Surface Mount Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Solderable per MIL-STD-202, Method 208e3
- Lead-free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- Weight: 0.006 grams (approximate)



Top View

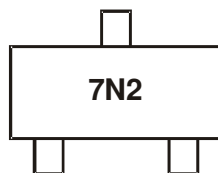

 Top View
Pin Configuration


Equivalent Circuit

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|-------------|-------|--------------------|
| ZXMN2A01FTA | SOT23 | 3,000/Tape & Reel |
| ZXMN2A01FTC | 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 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


7N2 = Product Type Marking Code

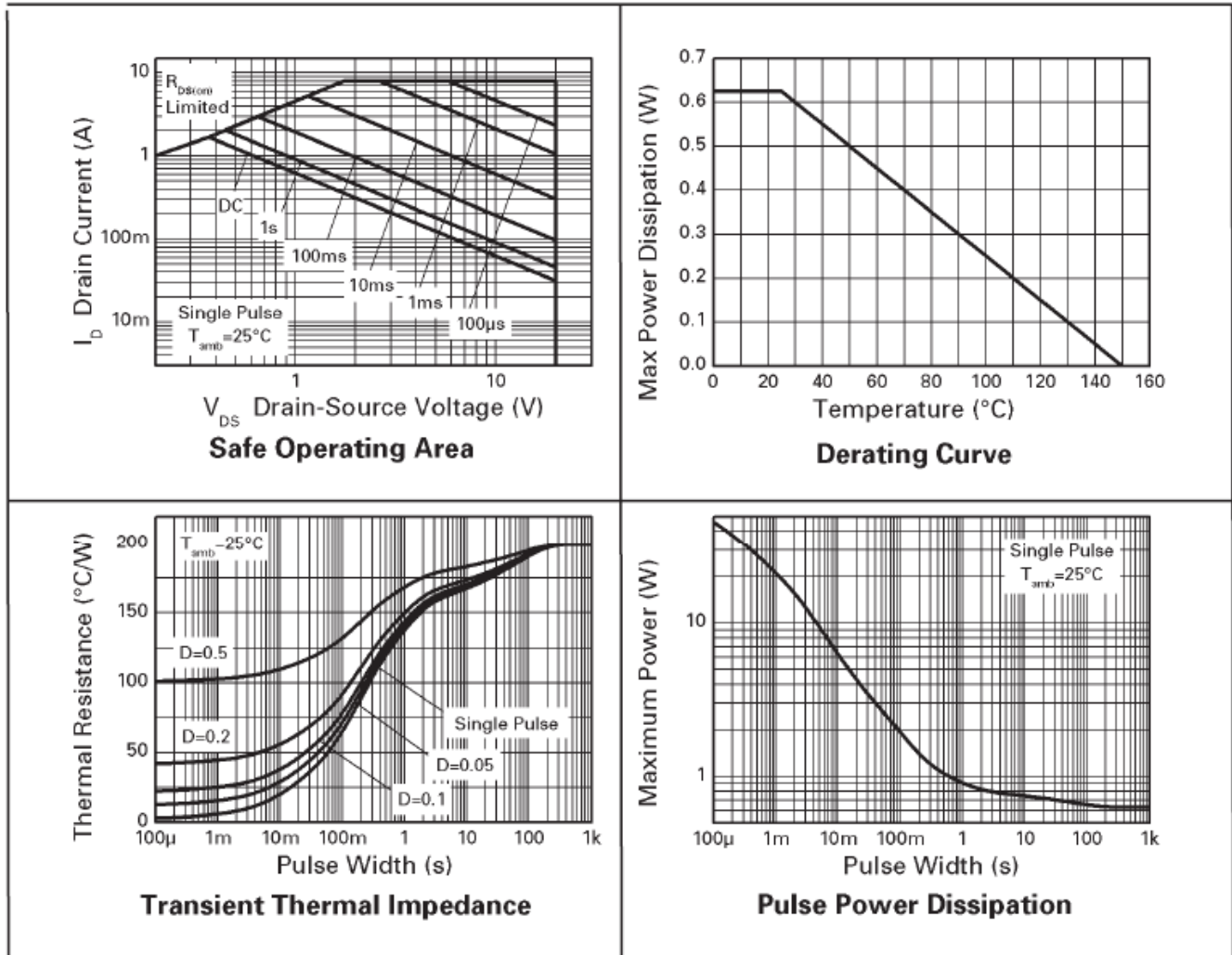
Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Units |
|---|----------|---------------------------|-----------|----------|-------|
| Drain-Source Voltage | | | V_{DSS} | 20 | V |
| Gate-Source Voltage | | | V_{GSS} | ± 12 | V |
| Continuous Drain Current, $V_{GS} = 10\text{V}$ | (Note 6) | $T_A = +25^\circ\text{C}$ | I_D | 2.2 | A |
| | (Note 6) | $T_A = +70^\circ\text{C}$ | | 1.7 | |
| | (Note 5) | $T_A = +25^\circ\text{C}$ | | 1.9 | |
| Pulsed Drain Current (Note 7) | | | I_{DM} | 8 | A |
| Maximum Body Diode Continuous Current (Note 6) | | | I_S | 1.29 | A |
| Maximum Body Diode Continuous Current (Note 7) | | | I_{SM} | 8 | A |

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

| Characteristic | | Symbol | Value | Units |
|---|----------|-----------------|-------------|----------------------|
| Total Power Dissipation | (Note 5) | P_D | 625 | mW |
| Linear Derating Factor | | | 5 | mW/ $^\circ\text{C}$ |
| Total Power Dissipation | (Note 6) | P_D | 806 | mW |
| Linear Derating Factor | | | 6.4 | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient | (Note 5) | $R_{\theta JA}$ | 200 | $^\circ\text{C/W}$ |
| | (Note 6) | | 155 | |
| Operating and Storage Temperature Range | | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

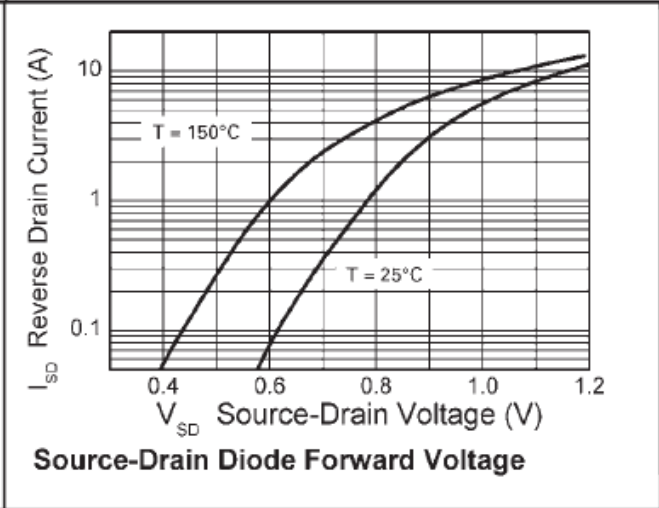
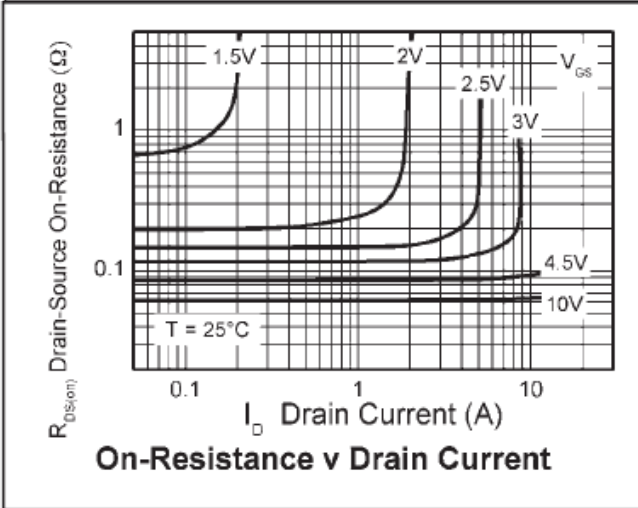
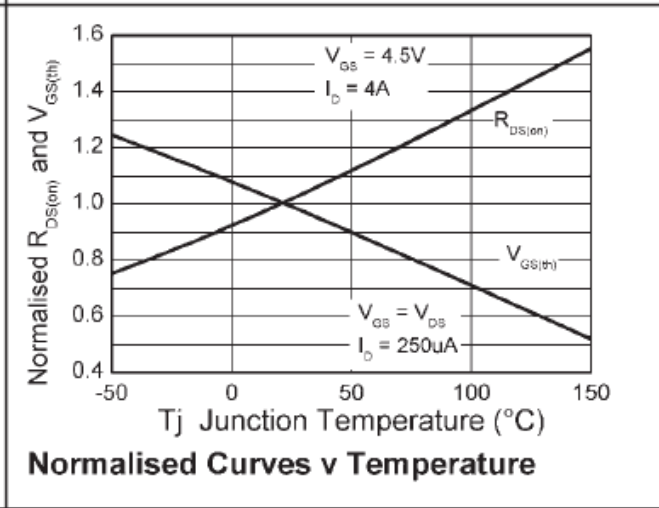
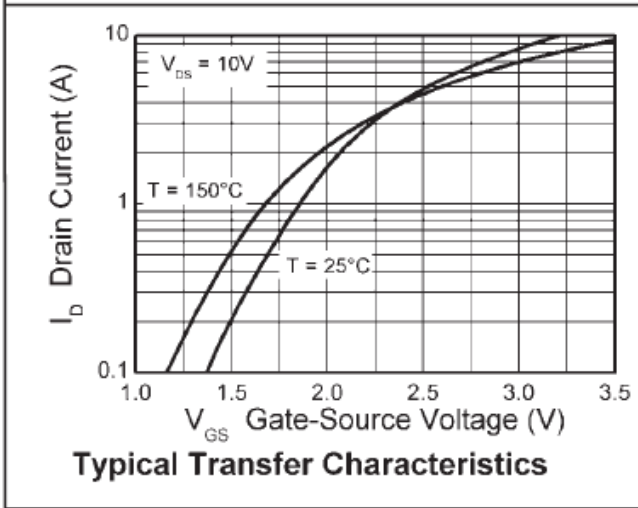
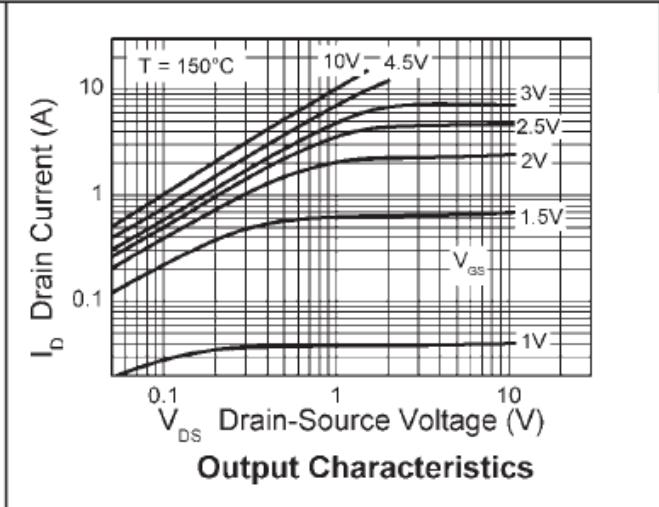
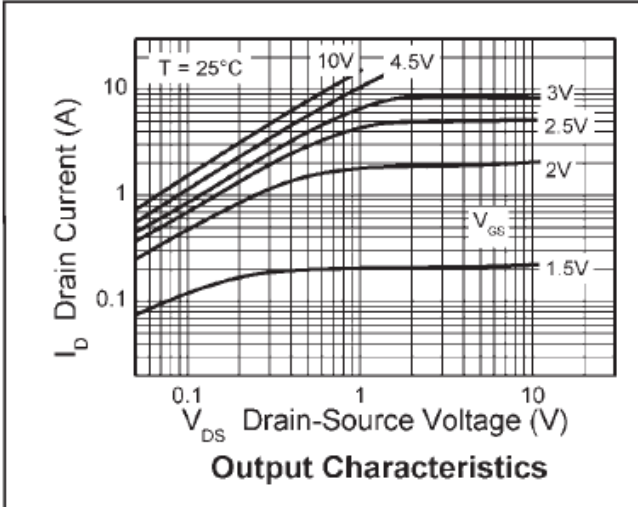
- Notes:
- For a device surface mounted on 25mm x 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
 - For a device surface mounted on FR-4 PCB measured at $t \leq 5$ secs.
 - Repetitive rating 25mm x 25mm FR4 PCB, $D = 0.05$, pulse width 10 μs - pulse width limited by maximum junction temperature. Refer to Transient Thermal Impedance graph.

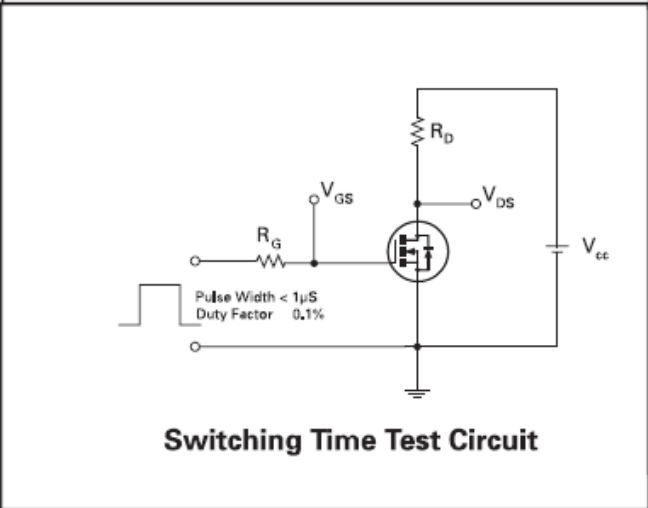
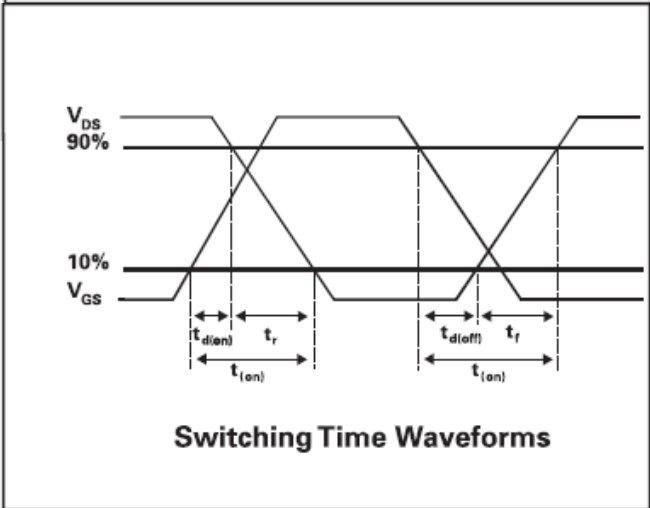
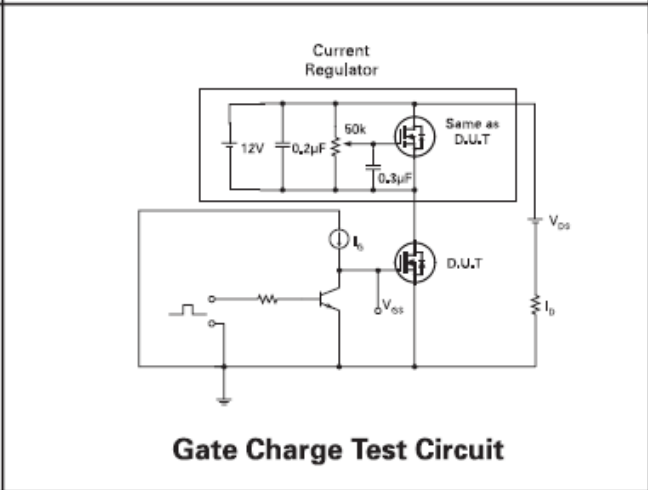
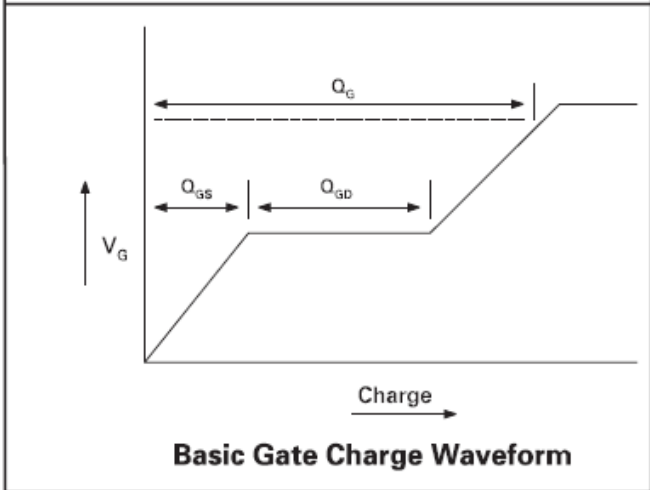
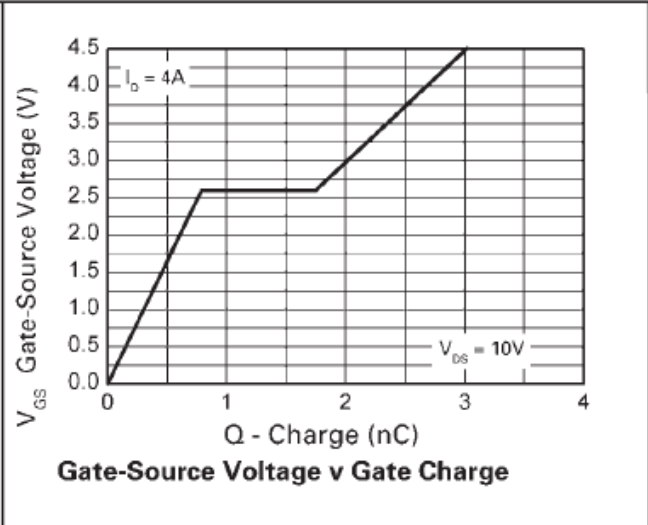
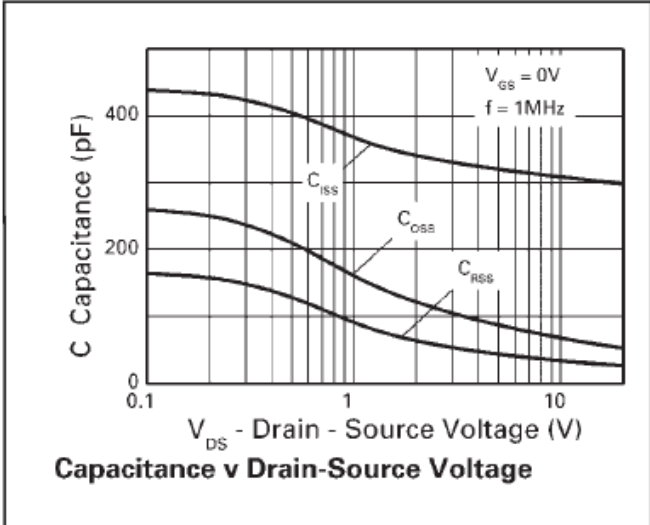


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|-----|------|-------|------|--|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 20 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | μA | V _{DS} = 20V, V _{GS} = 0V |
| Gate-Body Leakage | I _{GSS} | — | — | 100 | nA | V _{GS} = ±12V, V _{DS} = 0V |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | 0.7 | — | — | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance (Note 8) | R _{DS(on)} | — | — | 0.12 | Ω | V _{GS} = 4.5V, I _D = 4A |
| | | — | — | 0.225 | Ω | V _{GS} = 2.5V, I _D = 1.5A |
| Forward Transconductance | g _{FS} | — | 6.1 | — | S | V _{DS} = 10V, I _D = 4A |
| Diode Forward Voltage (Note 8 & 10) | V _{SD} | — | 0.85 | 0.95 | V | V _{GS} = 0V, I _S = 3.2A, T _J = +25°C |
| DYNAMIC CHARACTERISTICS (Note 10) | | | | | | |
| Input Capacitance | C _{iss} | — | 303 | — | pF | V _{DS} = 15V, V _{GS} = 0V, f = 1MHz |
| Output Capacitance | C _{oss} | — | 59 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 30 | — | | |
| Total Gate Charge (Note 9) | Q _g | — | 3.0 | — | nC | V _{DS} = 10V, V _{GS} = 10V, I _D = 4A |
| Gate-Source Charge (Note 9) | Q _{gs} | — | 0.8 | — | | |
| Gate-Drain Charge (Note 9) | Q _{gd} | — | 1.0 | — | | |
| Turn-On Delay Time (Note 9) | t _{D(on)} | — | 2.49 | — | ns | V _{DD} = 10V, I _D = 4A, R _G = 6Ω, V _{GS} = 5V |
| Turn-On Rise Time (Note 9) | t _r | — | 5.21 | — | | |
| Turn-Off Delay Time (Note 9) | t _{D(off)} | — | 7.47 | — | | |
| Turn-Off Fall Time (Note 9) | t _f | — | 4.62 | — | | |
| Reverse Recovery Time | t _{rr} | — | 23 | — | ns | T _J = +25°C, I _F = 4A, di/dt = 100A/μs |
| Reverse Recovery Charge | Q _{rr} | — | 5.65 | — | nC | |

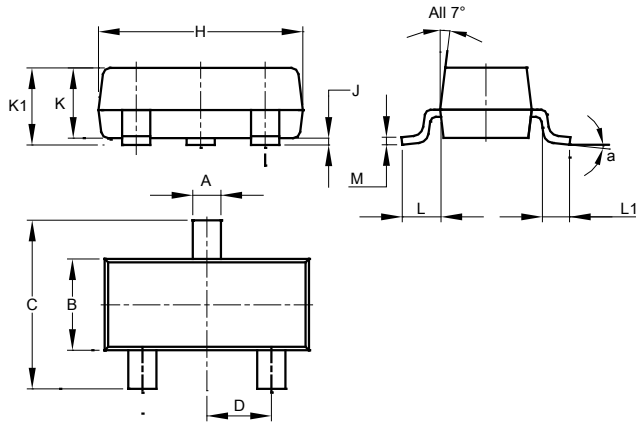
- Notes:
8. Measured under pulsed conditions. Width=300μs. Duty cycle ≤ 2%.
 9. Switching characteristics are independent of operating junction temperature.
 10. Guaranteed by design. Not subject to production testing.





Package Outline Dimensions

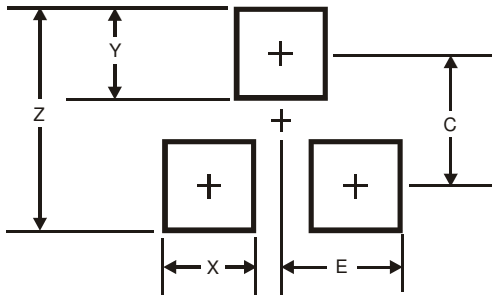
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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 | 0.890 | 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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