

**ZXMP6A17G**
**60V P-CHANNEL ENHANCEMENT MODE MOSFET**
**Product Summary**

| $V_{(BR)DSS}$ | $R_{DS(on)}$                     | $I_D$<br>$T_A = 25^\circ C$ |
|---------------|----------------------------------|-----------------------------|
| -60V          | 125m $\Omega$ @ $V_{GS} = -10V$  | -4.3A                       |
|               | 190m $\Omega$ @ $V_{GS} = -4.5V$ | -3.5A                       |

**Description and Applications**

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.

- Motor control
- DC-DC Converters
- Power management functions
- Uninterrupted power supply

**Features and Benefits**

- Fast switching speed
- Low gate drive
- Low input capacitance
- “Green” component and RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

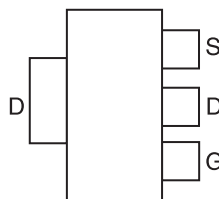
**Mechanical Data**

- Case: SOT-223
- 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 lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.112 grams (approximate)

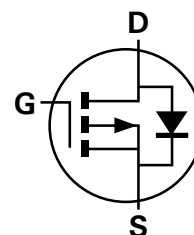
SOT223



Top View



Pin Out - Top View

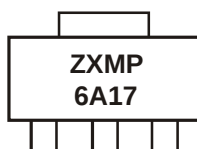


Equivalent Circuit

**Ordering Information (Note 1)**

| Product     | Marking   | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|-----------|--------------------|-----------------|-------------------|
| ZXMP6A17GTA | See below | 7                  | 12              | 1,000             |

Note: 1. Diodes, Inc. defines “Green” products as those which are RoHS compliant and contain no halogens or antimony compounds; further information about Diodes Inc.’s “Green” Policy can be found on our website. For packaging details, go to our website.

**Marking Information**


ZXMP = Product Type Marking Code, Line 1  
 6A17 = Product Type Marking Code, Line 2

**Maximum Ratings** @T<sub>A</sub> = 25°C unless otherwise specified

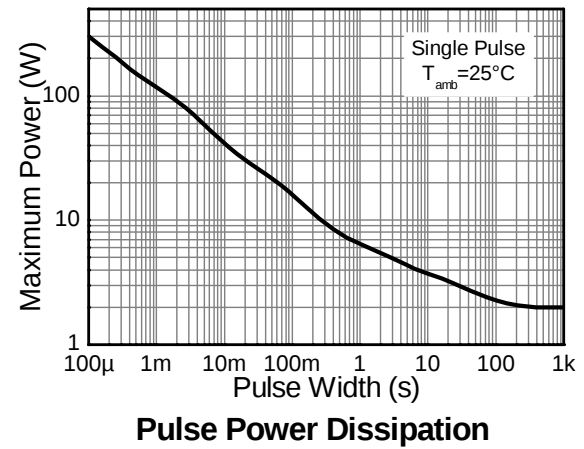
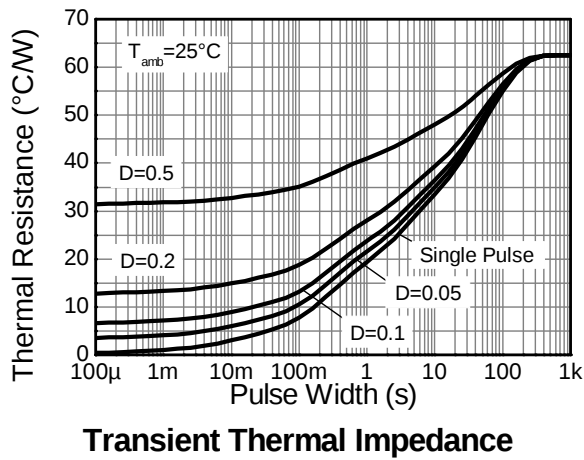
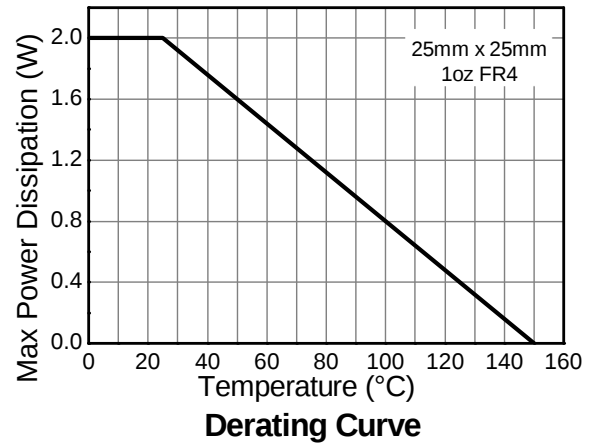
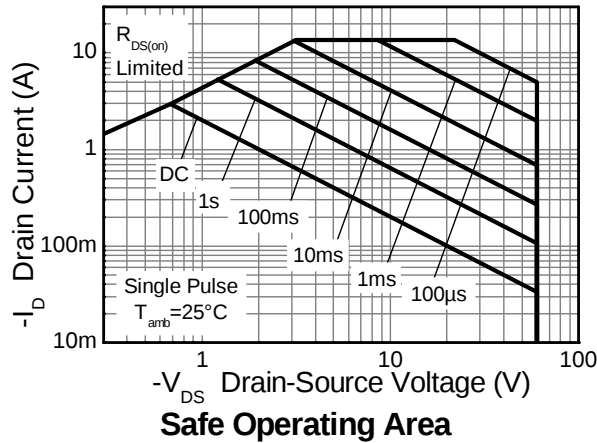
| Characteristic                         |                       |                                | Symbol           | Value | Unit |
|----------------------------------------|-----------------------|--------------------------------|------------------|-------|------|
| Drain-Source voltage                   |                       |                                | V <sub>DSS</sub> | -60   | V    |
| Gate-Source voltage                    |                       |                                | V <sub>GS</sub>  | ±20   | V    |
| Continuous Drain current               | V <sub>GS</sub> = 10V | (Note 3)                       | I <sub>D</sub>   | -4.3  | A    |
|                                        |                       | T <sub>A</sub> = 70°C (Note 3) |                  | -3.5  |      |
|                                        |                       | (Note 2)                       |                  | -3.0  |      |
| Pulsed Drain current                   | V <sub>GS</sub> = 10V | (Note 4)                       | I <sub>DM</sub>  | -13.7 | A    |
| Continuous Source current (Body diode) |                       | (Note 3)                       | I <sub>S</sub>   | -4.8  | A    |
| Pulsed Source current (Body diode)     |                       | (Note 4)                       | I <sub>SM</sub>  | -13.7 | A    |

**Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                          |          | Symbol                            | Value      | Unit  |
|-----------------------------------------|----------|-----------------------------------|------------|-------|
| Power dissipation                       | (Note 2) | P <sub>D</sub>                    | 2.0        | W     |
|                                         |          |                                   | 16         |       |
| Linear derating factor                  | (Note 3) |                                   | 3.9        | mW/°C |
|                                         |          |                                   | 31         |       |
| Thermal Resistance, Junction to Ambient | (Note 2) | R <sub>θJA</sub>                  | 62.5       | °C/W  |
|                                         | (Note 3) |                                   | 32.0       |       |
| Thermal Resistance, Junction to Lead    | (Note 5) | R <sub>θJL</sub>                  | 9.8        |       |
| Operating and storage temperature range |          | T <sub>J</sub> , T <sub>STG</sub> | -55 to 150 | °C    |

- Notes:
2. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  3. Same as note (2), except the device is measured at t ≤ 10 sec.
  4. Same as note (2), except the device is pulsed with D= 0.02 and pulse width 300 μs. The pulse current is limited by the maximum junction temperature.
  5. Thermal resistance from junction to solder-point (at the end of the drain lead).

## Thermal Characteristics

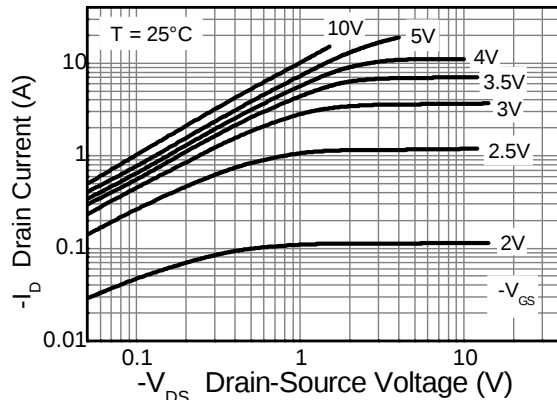


**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

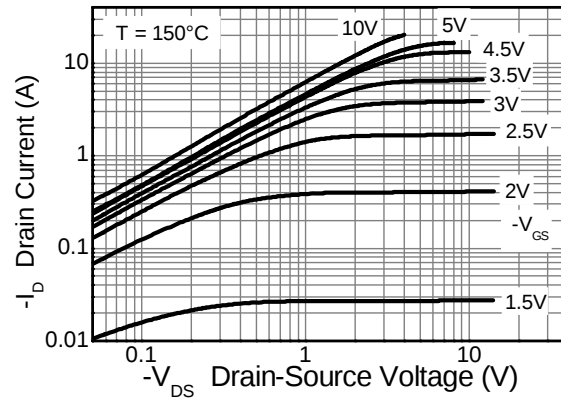
| Characteristic                             | Symbol               | Min  | Typ   | Max   | Unit | Test Condition                                                                                |                                                  |
|--------------------------------------------|----------------------|------|-------|-------|------|-----------------------------------------------------------------------------------------------|--------------------------------------------------|
| 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 | —     | —     | V    | I <sub>D</sub> = -250μA, V <sub>DS</sub> = V <sub>GS</sub>                                    |                                                  |
| Static Drain-Source On-Resistance (Note 6) | R <sub>DS (ON)</sub> | —    | 0.096 | 0.125 | Ω    | V <sub>GS</sub> = -10V, I <sub>D</sub> = -2.2A                                                |                                                  |
|                                            |                      |      | 0.120 | 0.190 |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -1.8A                                               |                                                  |
| Forward Transconductance (Notes 6 & 7)     | g <sub>fs</sub>      | —    | 4.7   | —     | S    | V <sub>DS</sub> = -15V, I <sub>D</sub> = -2.2A                                                |                                                  |
| Diode Forward Voltage (Note 6)             | V <sub>SD</sub>      | —    | -0.85 | -0.95 | V    | I <sub>S</sub> = -2.0A, V <sub>GS</sub> = 0V, T <sub>J</sub> = 25°C                           |                                                  |
| Reverse recovery time (Note 7)             | t <sub>rr</sub>      | —    | 25.1  | —     | ns   | I <sub>S</sub> = -1.7A, di/dt = 100A/μs,<br>T <sub>J</sub> = 25°C                             |                                                  |
| Reverse recovery charge (Note 7)           | Q <sub>rr</sub>      | —    | 27.2  | —     | nC   |                                                                                               |                                                  |
| DYNAMIC CHARACTERISTICS (Note 7)           |                      |      |       |       |      |                                                                                               |                                                  |
| Input Capacitance                          | C <sub>iss</sub>     | —    | 637   | —     | pF   | V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V<br>f = 1MHz                                      |                                                  |
| Output Capacitance                         | C <sub>oss</sub>     | —    | 70.0  | —     | pF   |                                                                                               |                                                  |
| Reverse Transfer Capacitance               | C <sub>rss</sub>     | —    | 53.0  | —     | pF   |                                                                                               |                                                  |
| Total Gate Charge (Note 8)                 | Q <sub>g</sub>       | —    | 9.0   | —     | nC   | V <sub>GS</sub> = -4.5V                                                                       | V <sub>DS</sub> = -30V<br>I <sub>D</sub> = -2.2A |
| Total Gate Charge (Note 8)                 | Q <sub>g</sub>       | —    | 17.7  | —     | nC   | V <sub>GS</sub> = -10V                                                                        |                                                  |
| Gate-Source Charge (Note 8)                | Q <sub>gs</sub>      | —    | 1.6   | —     | nC   |                                                                                               |                                                  |
| Gate-Drain Charge (Note 8)                 | Q <sub>gd</sub>      | —    | 4.4   | —     | nC   |                                                                                               |                                                  |
| Turn-On Delay Time (Note 8)                | t <sub>D(on)</sub>   | —    | 2.6   | —     | ns   | V <sub>DD</sub> = -30V, V <sub>GS</sub> = -10V<br>I <sub>D</sub> = -1A, R <sub>G</sub> = 6.0Ω |                                                  |
| Turn-On Rise Time (Note 8)                 | t <sub>r</sub>       | —    | 3.4   | —     | ns   |                                                                                               |                                                  |
| Turn-Off Delay Time (Note 8)               | t <sub>D(off)</sub>  | —    | 26.2  | —     | ns   |                                                                                               |                                                  |
| Turn-Off Fall Time (Note 8)                | t <sub>f</sub>       | —    | 11.3  | —     | ns   |                                                                                               |                                                  |

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

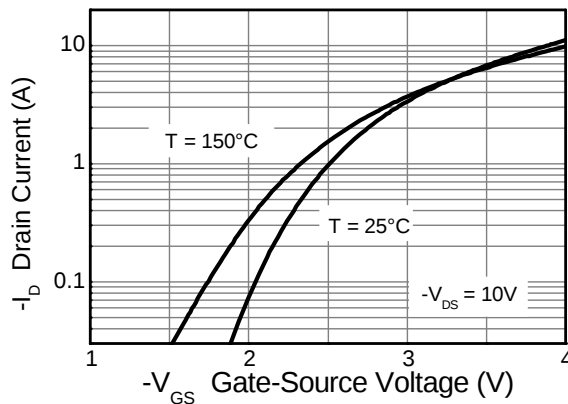
## Typical Characteristics



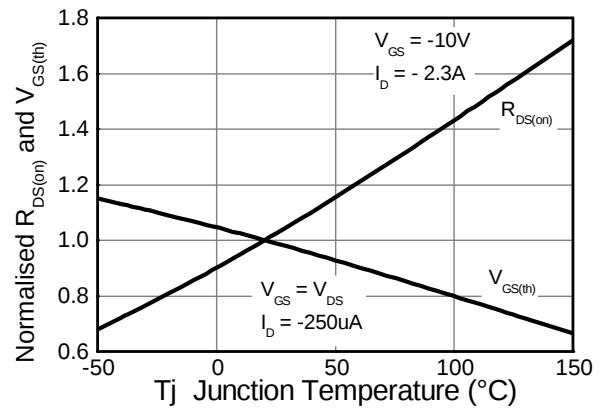
**Output Characteristics**



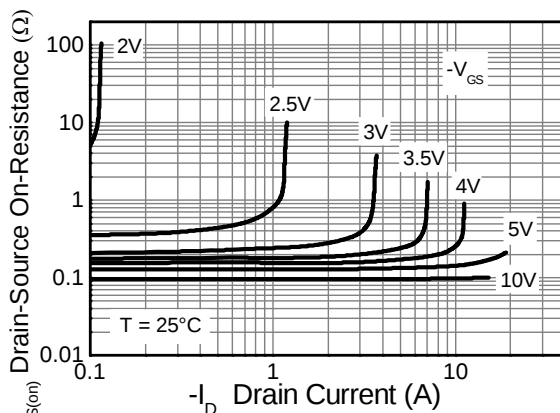
**Output Characteristics**



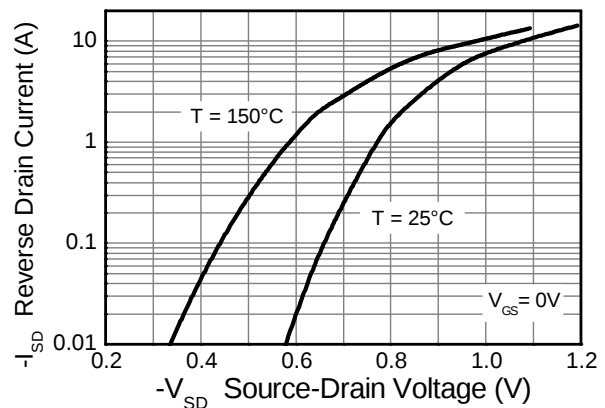
**Typical Transfer Characteristics**



**Normalised Curves v Temperature**

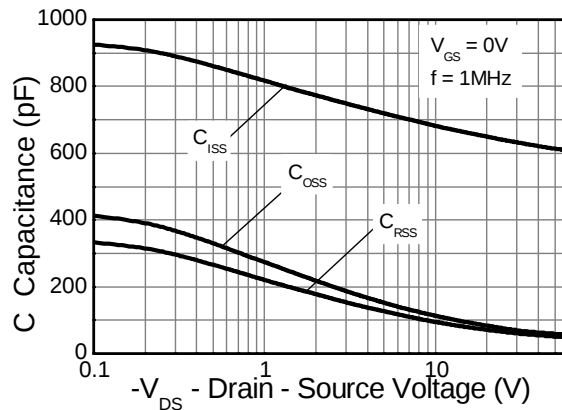


**On-Resistance v Drain Current**

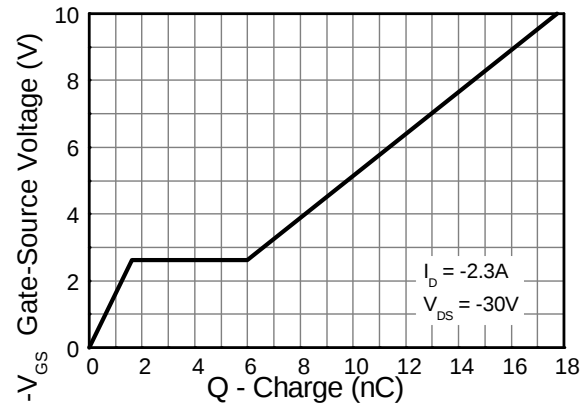


**Source-Drain Diode Forward Voltage**

## Typical Characteristics – continued

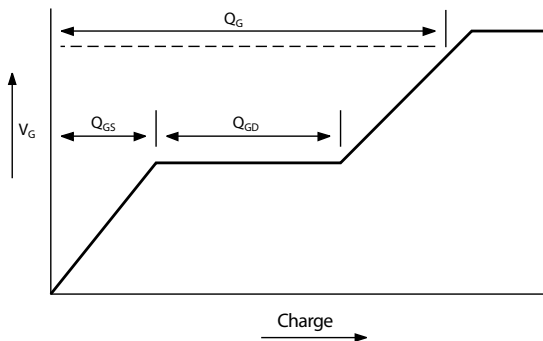


Capacitance v Drain-Source Voltage

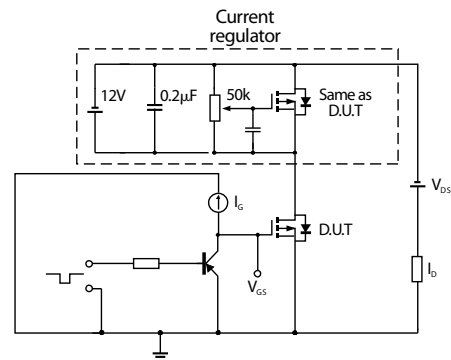


Gate-Source Voltage v Gate Charge

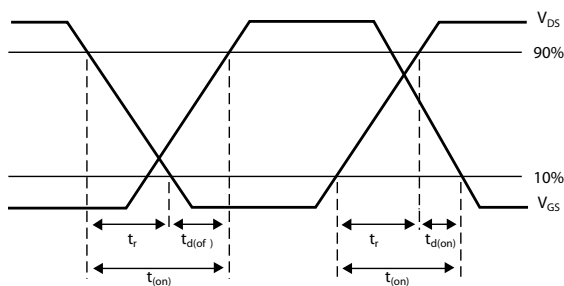
## Test Circuits



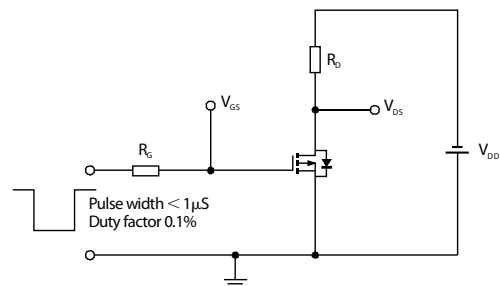
Basic gate charge waveform



Gate charge test circuit

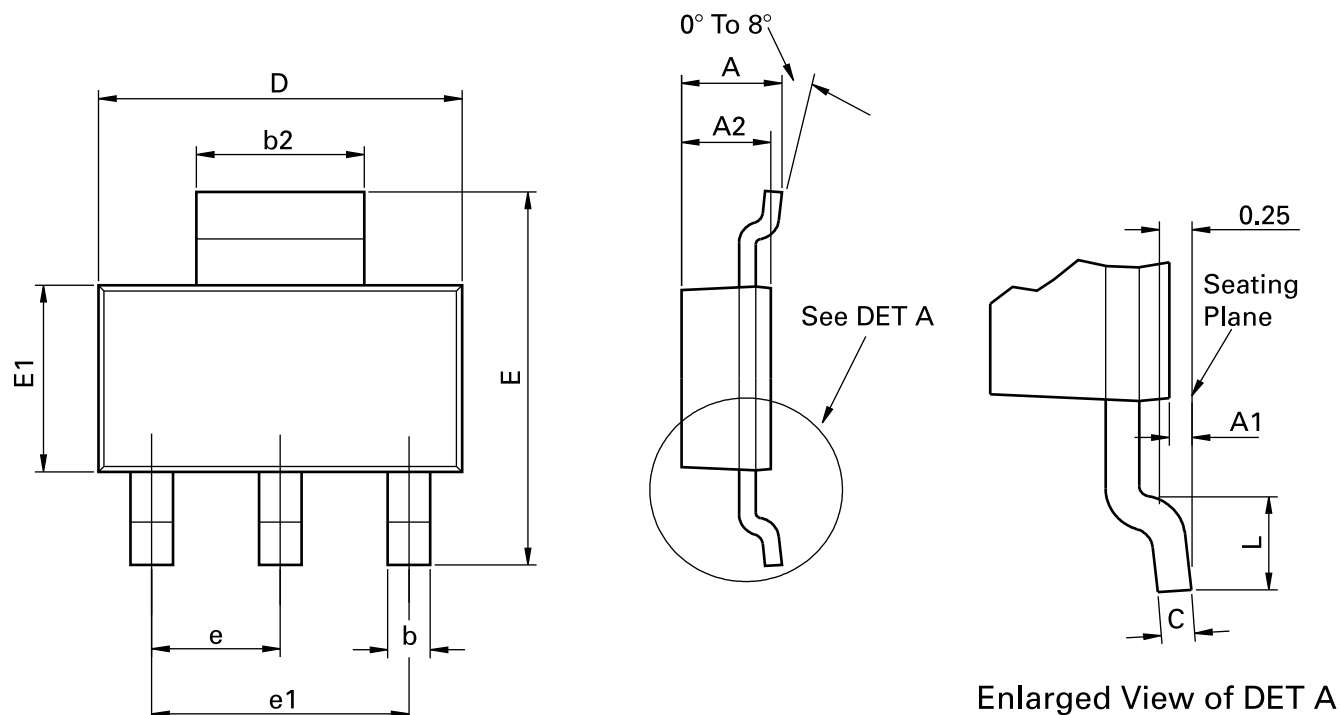


Switching time waveforms



Switching time test circuit

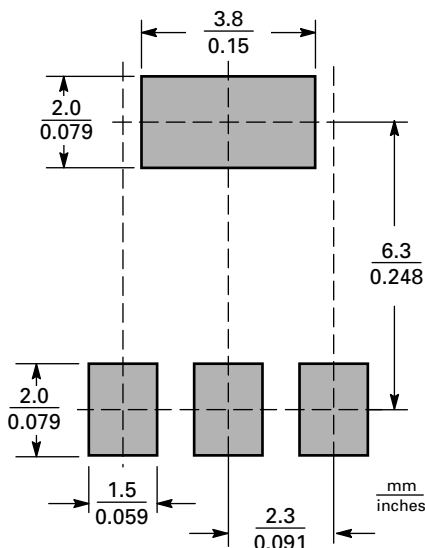
## Package Outline Dimensions



Conforms to JEDEC TO-261 AA Issue B

| DIM | Millimeters |      | Inches |        | DIM | Millimeters |      | Inches     |       |
|-----|-------------|------|--------|--------|-----|-------------|------|------------|-------|
|     | Min         | Max  | Min    | Max    |     | Min         | Max  | Min        | Max   |
| A   | -           | 1.80 | -      | 0.071  | D   | 6.30        | 6.70 | 0.248      | 0.264 |
| A1  | 0.02        | 0.10 | 0.0008 | 0.004  | e   | 2.30 BSC    |      | 0.0905 BSC |       |
| A2  | 1.55        | 1.65 | 0.0610 | 0.0649 | e1  | 4.60 BSC    |      | 0.181 BSC  |       |
| b   | 0.66        | 0.84 | 0.026  | 0.033  | E   | 6.70        | 7.30 | 0.264      | 0.287 |
| b2  | 2.90        | 3.10 | 0.114  | 0.122  | E1  | 3.30        | 3.70 | 0.130      | 0.146 |
| C   | 0.23        | 0.33 | 0.009  | 0.013  | L   | 0.90        | -    | 0.355      | -     |

## Suggested Pad Layout



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