

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$                            | $I_D$<br>$T_A = 25^\circ\text{C}$ |
|---------------|-----------------------------------------|-----------------------------------|
| -60V          | 125m $\Omega$ @ $V_{GS} = -10\text{V}$  | -6.6A                             |
|               | 190m $\Omega$ @ $V_{GS} = -4.5\text{V}$ | -5.3A                             |

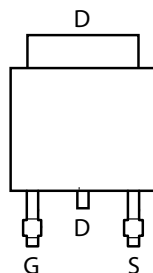
## Description and Applications

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.

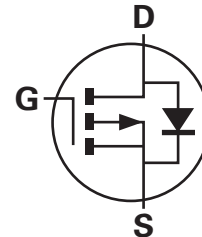
- Backlighting
- DC-DC Converters
- Power management functions



Top View



Pin Out -Top View



Equivalent Circuit

## Features and Benefits

- Low on-resistance
- Fast switching speed
- "Green" component and RoHS compliant (Note 1)

## Mechanical Data

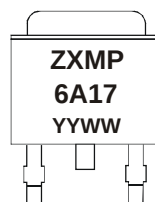
- Case: TO252-3L
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals Connections: See Diagram
- Terminals: Matte Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.33 grams (approximate)

## Ordering Information (Note 1)

| Product     | Marking   | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|-----------|--------------------|-----------------|-------------------|
| ZXMP6A17KTC | See Below | 13                 | 16              | 2,500             |

Note: 1. Diodes, Inc. defines "Green" products as those which are Eu 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  
 YYWW = Date Code Marking  
 YY = Year (ex: 09 = 2009)  
 WW = Week (01-52)

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

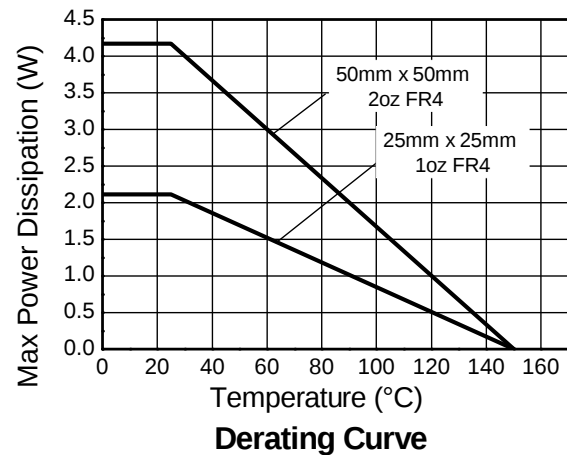
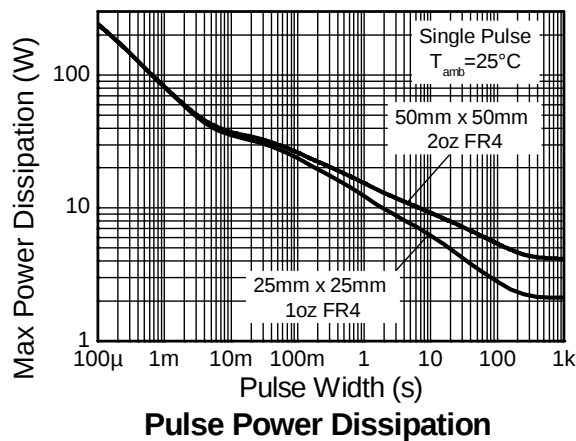
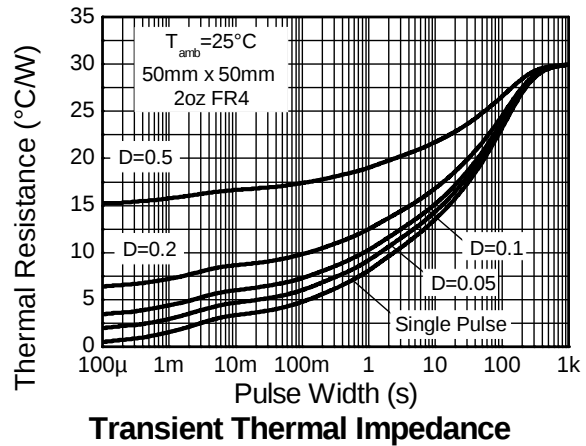
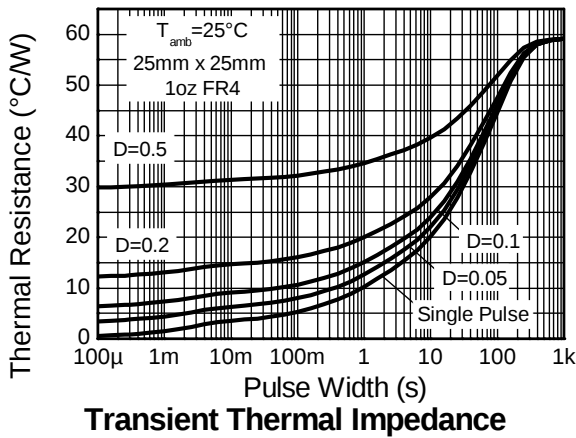
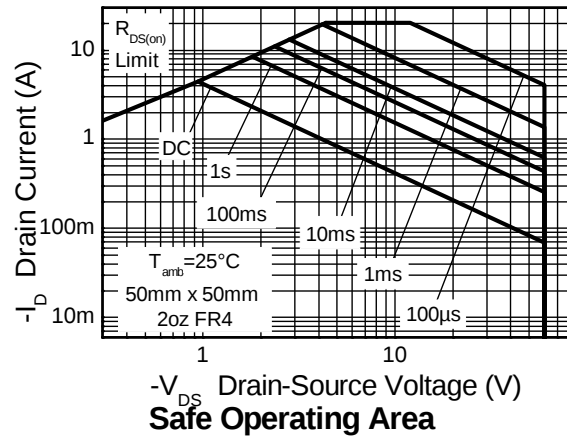
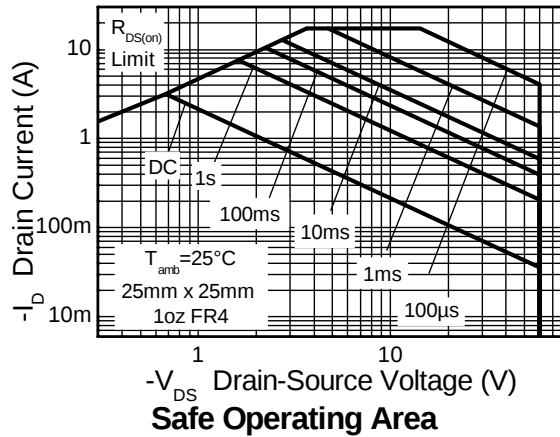
| Characteristic                         |                       |                               | Symbol           | Value | Unit |
|----------------------------------------|-----------------------|-------------------------------|------------------|-------|------|
| Drain-Source voltage                   |                       |                               | 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>   | 6.6   | A    |
|                                        |                       | T <sub>A</sub> =70°C (Note 3) |                  | 5.3   |      |
|                                        |                       | (Note 2)                      |                  | 4.4   |      |
| Pulsed Drain current                   | V <sub>GS</sub> = 10V | (Note 4)                      | I <sub>DM</sub>  | 20.3  | A    |
| Continuous Source current (Body diode) |                       | (Note 3)                      | I <sub>S</sub>   | 9.3   | A    |
| Pulsed Source current (Body diode)     |                       | (Note 4)                      | I <sub>SM</sub>  | 20.3  | A    |

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

| Characteristic                              |          | Symbol                            | Value      | Unit       |
|---------------------------------------------|----------|-----------------------------------|------------|------------|
| Power dissipation<br>Linear derating factor | (Note 2) | P <sub>D</sub>                    | 4.17       | W<br>mW/°C |
|                                             |          |                                   | 33.3       |            |
|                                             | (Note 3) |                                   | 9.25       |            |
|                                             |          |                                   | 74.0       |            |
| Thermal Resistance, Junction to Ambient     | (Note 2) | R <sub>θJA</sub>                  | 2.11       | °C/W       |
|                                             |          |                                   | 16.8       |            |
|                                             | (Note 3) |                                   | 30.0       |            |
|                                             |          |                                   | 13.5       |            |
| Thermal Resistance, Junction to Lead        | (Note 5) | R <sub>θJL</sub>                  | 59.1       |            |
|                                             | (Note 6) |                                   | 2.41       |            |
| 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 50mm x 50mm 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.
  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. 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.
  6. Thermal resistance from junction to solder-point (at the end of the drain lead).

## Thermal Characteristics

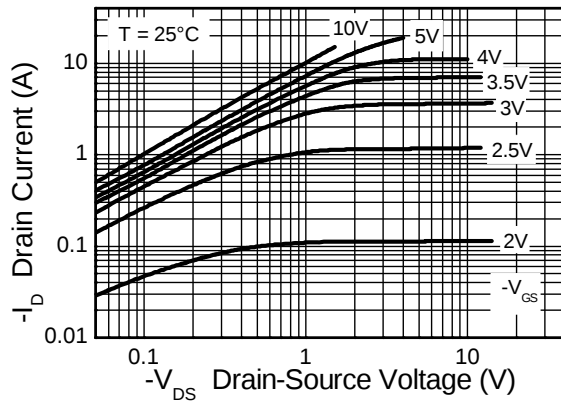


**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

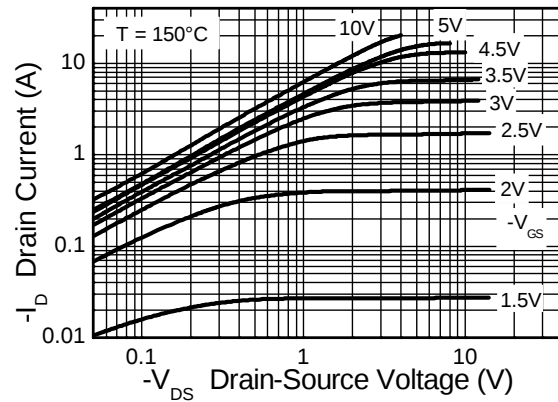
| Characteristic                             | Symbol               | Min  | Typ   | Max   | Unit | Test Condition                                                                                |                                                  |
|--------------------------------------------|----------------------|------|-------|-------|------|-----------------------------------------------------------------------------------------------|--------------------------------------------------|
| 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 7) | R <sub>DS (ON)</sub> | —    | —     | 0.125 | Ω    | V <sub>GS</sub> = -10V, I <sub>D</sub> = -2.3A                                                |                                                  |
|                                            |                      |      |       | 0.190 |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -1.9A                                               |                                                  |
| Forward Transconductance (Notes 7 & 8)     | g <sub>fS</sub>      | —    | 4.7   | —     | S    | V <sub>DS</sub> = -15V, I <sub>D</sub> = -2.2A                                                |                                                  |
| Diode Forward Voltage (Note 7)             | V <sub>SD</sub>      | —    | -0.85 | -0.95 | V    | I <sub>S</sub> = -2A, V <sub>GS</sub> = 0V                                                    |                                                  |
| Reverse recovery time (Note 8)             | t <sub>rr</sub>      |      | 25.1  | —     | ns   | I <sub>S</sub> = -1.7A, di/dt= 100A/μs                                                        |                                                  |
| Reverse recovery charge (Note 8)           | Q <sub>rr</sub>      | —    | 27.2  | —     | nC   |                                                                                               |                                                  |
| DYNAMIC CHARACTERISTICS (Note 8)           |                      |      |       |       |      |                                                                                               |                                                  |
| 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    | —     | pF   |                                                                                               |                                                  |
| Reverse Transfer Capacitance               | C <sub>rss</sub>     | —    | 53    | —     | pF   |                                                                                               |                                                  |
| Total Gate Charge                          | 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                          | Q <sub>g</sub>       | —    | 17.7  | —     | nC   | V <sub>GS</sub> = -10V                                                                        |                                                  |
| Gate-Source Charge                         | Q <sub>gs</sub>      | —    | 1.6   | —     | nC   |                                                                                               |                                                  |
| Gate-Drain Charge                          | Q <sub>gd</sub>      | —    | 4.4   | —     | nC   |                                                                                               |                                                  |
| Turn-On Delay Time (Note 9)                | 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 9)                 | t <sub>r</sub>       | —    | 3.4   | —     | ns   |                                                                                               |                                                  |
| Turn-Off Delay Time (Note 9)               | t <sub>D(off)</sub>  | —    | 26.2  | —     | ns   |                                                                                               |                                                  |
| Turn-Off Fall Time (Note 9)                | t <sub>f</sub>       | —    | 11.3  | —     | ns   |                                                                                               |                                                  |

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

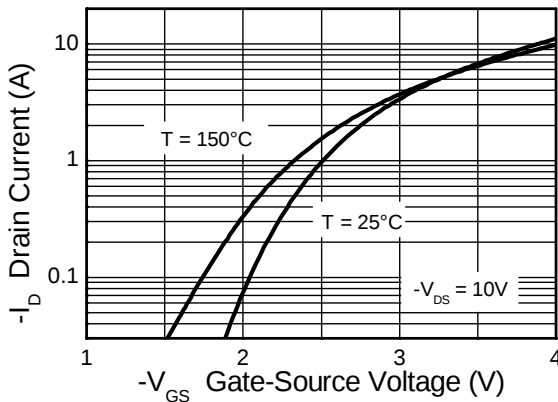
## Typical Characteristics



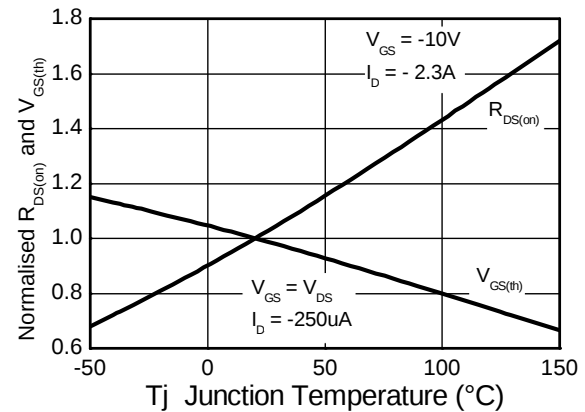
Output Characteristics



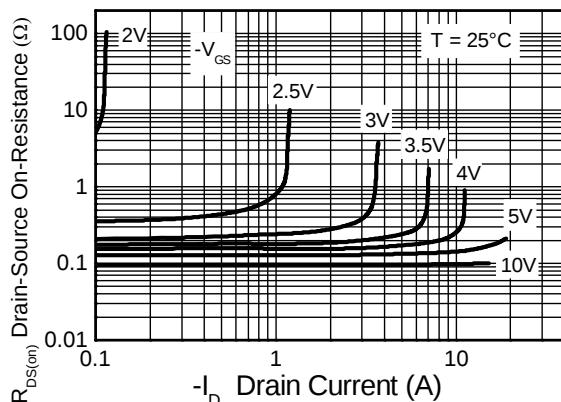
Output Characteristics



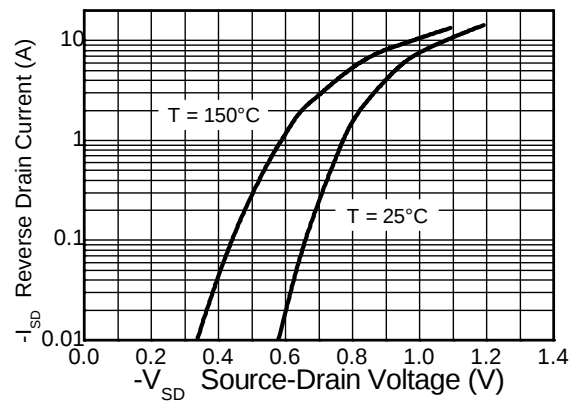
Typical Transfer Characteristics



Normalised Curves v Temperature

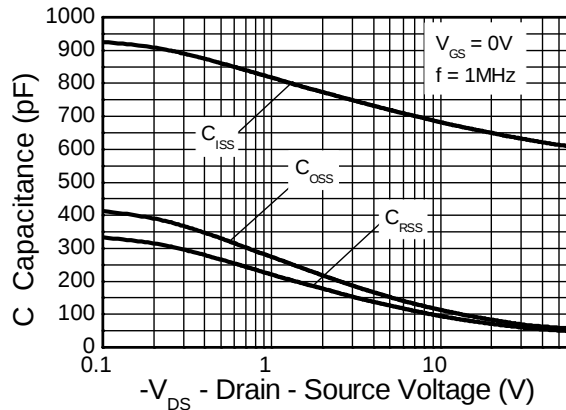


On-Resistance v Drain Current

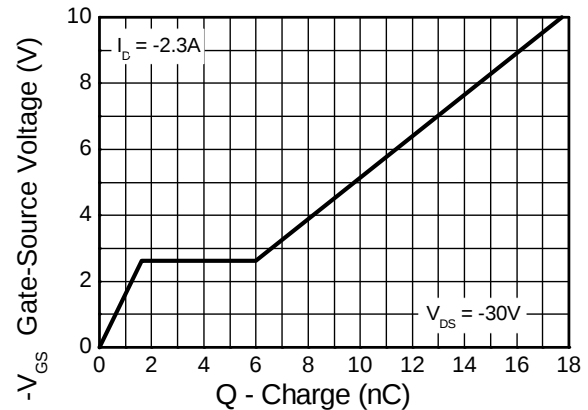


Source-Drain Diode Forward Voltage

## Typical Characteristics - continued

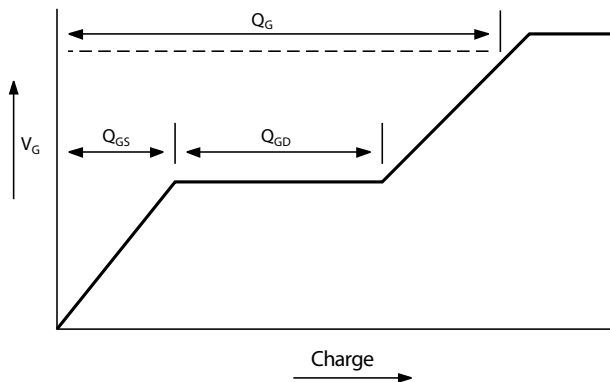


Capacitance v Drain-Source Voltage

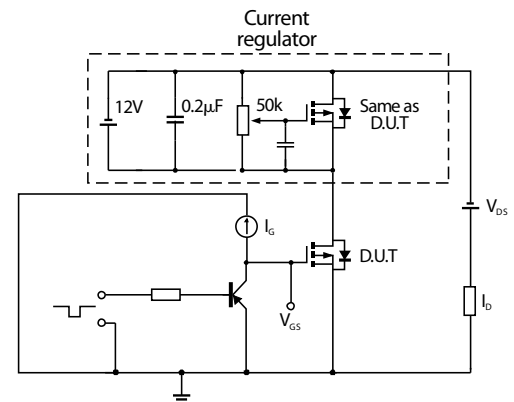


Gate-Source Voltage v Gate Charge

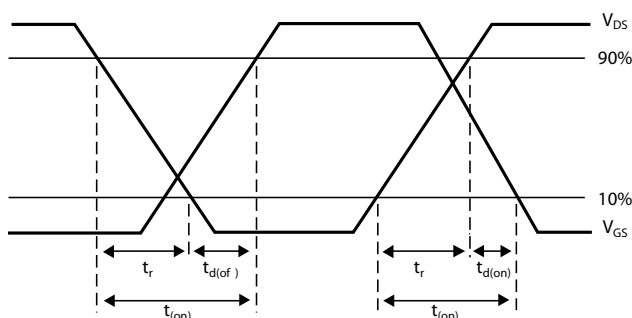
## Test Circuits



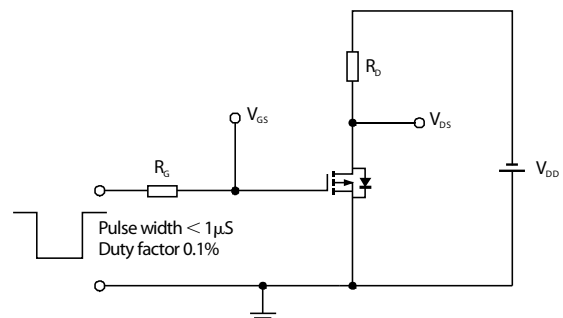
Basic gate charge waveform



Gate charge test circuit

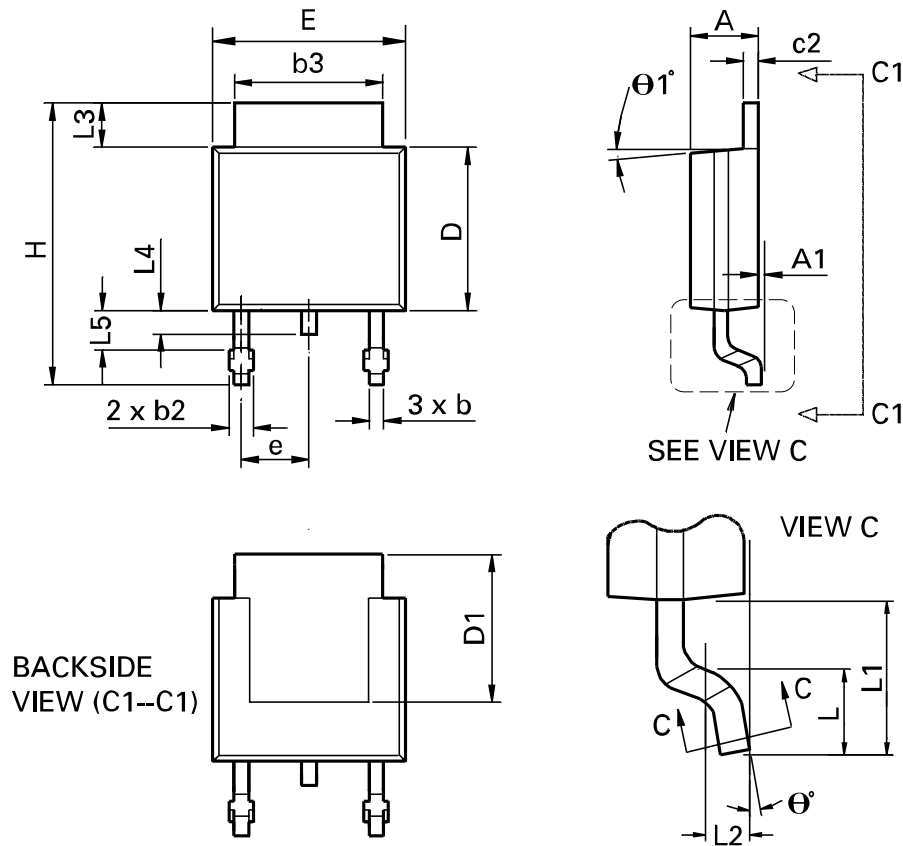


Switching time waveforms



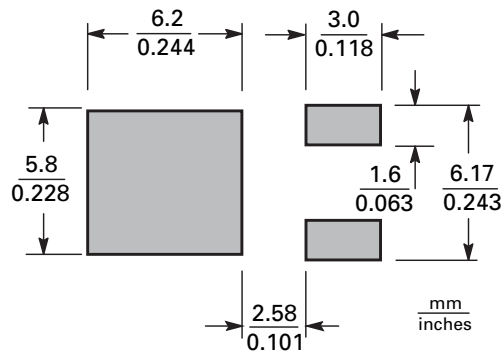
Switching time test circuit

## Package Outline Dimensions



| DIM | Inches |       | Millimeters |       | DIM              | Inches    |       | Millimeters |       |
|-----|--------|-------|-------------|-------|------------------|-----------|-------|-------------|-------|
|     | Min    | Max   | Min         | Max   |                  | Min       | Max   | Min         | Max   |
| A   | 0.086  | 0.094 | 2.18        | 2.39  | e                | 0.090 BSC |       | 2.29 BSC    |       |
| A1  | -      | 0.005 | -           | 0.127 | H                | 0.370     | 0.410 | 9.40        | 10.41 |
| b   | 0.020  | 0.035 | 0.508       | 0.89  | L                | 0.055     | 0.070 | 1.40        | 1.78  |
| b2  | 0.030  | 0.045 | 0.762       | 1.14  | L1               | 0.108 REF |       | 2.74 REF    |       |
| b3  | 0.205  | 0.215 | 5.21        | 5.46  | L2               | 0.020 BSC |       | 0.508 BSC   |       |
| c   | 0.018  | 0.024 | 0.457       | 0.61  | L3               | 0.035     | 0.065 | 0.89        | 1.65  |
| c2  | 0.018  | 0.023 | 0.457       | 0.584 | L4               | 0.025     | 0.040 | 0.635       | 1.016 |
| D   | 0.213  | 0.245 | 5.41        | 6.22  | L5               | 0.045     | 0.060 | 1.14        | 1.52  |
| D1  | 0.205  | -     | 5.21        | -     | $\theta_1^\circ$ | 0°        | 10°   | 0°          | 10°   |
| E   | 0.250  | 0.265 | 6.35        | 6.73  | $\theta^\circ$   | 0°        | 15°   | 0°          | 15°   |
| E1  | 0.170  | -     | 4.32        | -     | -                | -         | -     | -           | -     |

## Suggested Pad Layout



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**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литера Н,  
помещение 100-Н Офис 331