

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max        | I <sub>D</sub> Max<br>T <sub>A</sub> = +25°C |
|-------------------|--------------------------------|----------------------------------------------|
| 60V               | 0.08Ω @ V <sub>GS</sub> = 10V  | 5.3A                                         |
|                   | 0.15Ω @ V <sub>GS</sub> = 4.5V | 2.8A                                         |

## Features and Benefits

- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The ZXMN6A08GQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

## Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- BLDC Motors
- DC-DC Converters
- Load Switch

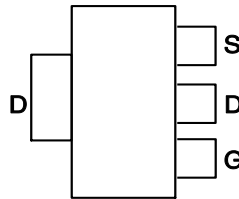
## Mechanical Data

- Case: SOT223
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Solderable per MIL-STD-202, Method 208②
- Weight: 0.112 grams (Approximate)

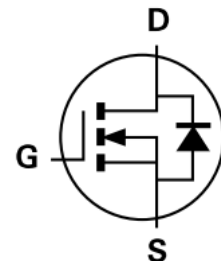
SOT223 (Type ZN)



Top View



Pin Out - Top View



Equivalent Circuit

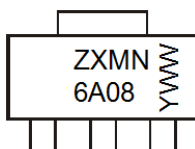
## Ordering Information (Note 4)

| Part Number  | Case             | Packaging        |
|--------------|------------------|------------------|
| ZXMN6A08GQTA | SOT223 (Type ZN) | 1000/Tape & Reel |
| ZXMN6A08GQTC | SOT223 (Type ZN) | 4000/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information

SOT223 (Type ZN)



ZXMN6A08 = Product Type Marking Code  
YWW = Date Code Marking  
Y = Last Digit of Year (ex: 0 = 2020)  
WW = Week Code (01 to 53)

## Maximum Ratings

| Characteristic                                    | Symbol         | Value                        | Unit           |
|---------------------------------------------------|----------------|------------------------------|----------------|
| Drain-Source Voltage                              | $V_{DS}$       | 60                           | V              |
| Gate-Source Voltage                               | $V_{GS}$       | $\pm 20$                     | V              |
| Continuous Drain Current @ $V_{GS} = 10V$         | $I_D$          | $T_A = +25^\circ C$ (Note 6) | A              |
|                                                   |                | $T_A = +70^\circ C$ (Note 6) | A              |
|                                                   |                | $T_A = +25^\circ C$ (Note 5) | A              |
| Pulsed Drain Current (Note 7)                     | $I_{DM}$       | 20                           | A              |
| Continuous Source Current (Body Diode) (Note 6)   | $I_S$          | 2.1                          | A              |
| Pulsed Source Current (Body Diode) (Note 7)       | $I_{SM}$       | 20                           | A              |
| Power Dissipation at $T_A = +25^\circ C$ (Note 5) | $P_D$          | 2                            | W              |
| Linear Derating Factor                            |                | 16                           | mW/ $^\circ C$ |
| Power Dissipation at $T_A = +25^\circ C$ (Note 6) | $P_D$          | 3.9                          | W              |
| Linear Derating Factor                            |                | 31                           | mW/ $^\circ C$ |
| Operating and Storage Temperature Range           | $T_J, T_{STG}$ | -55 to +150                  | $^\circ C$     |

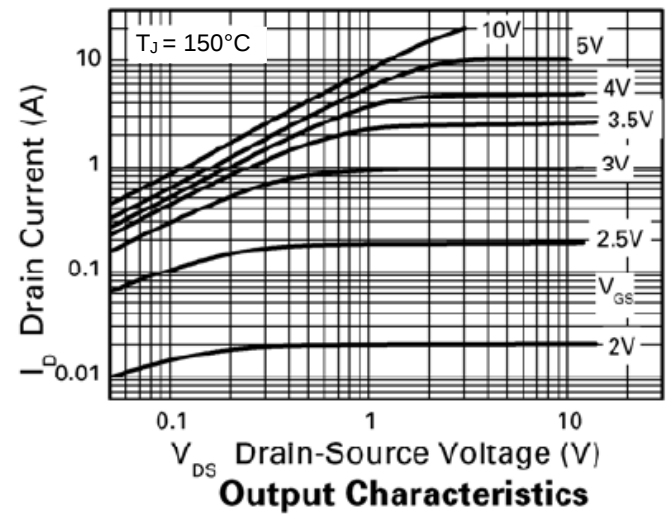
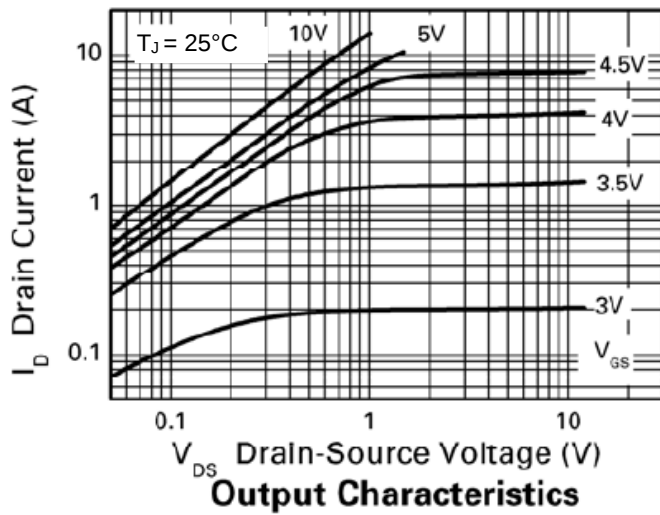
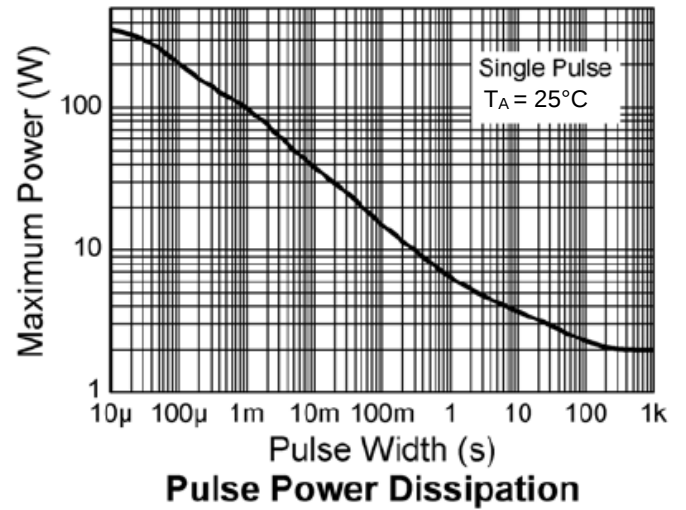
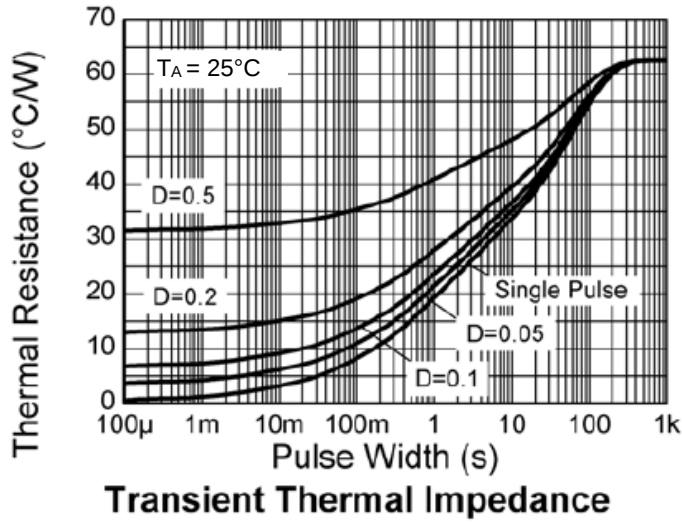
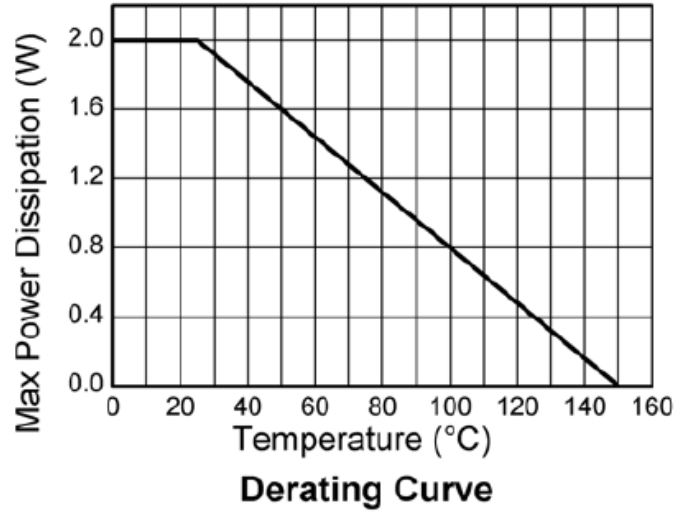
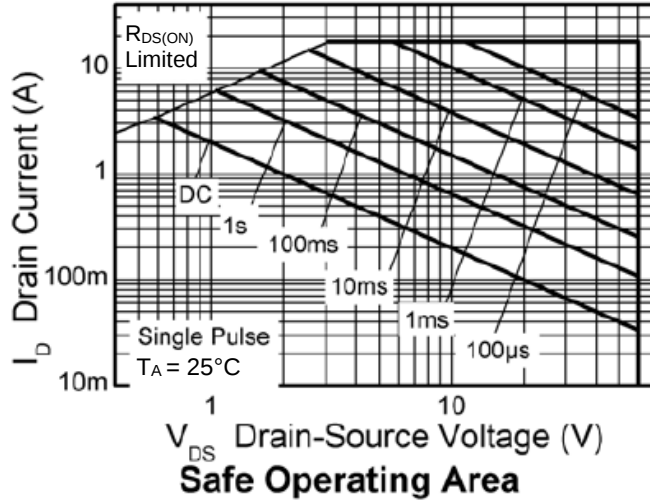
## Thermal Characteristics (@ $T_A = +25^\circ C$ , unless otherwise specified.)

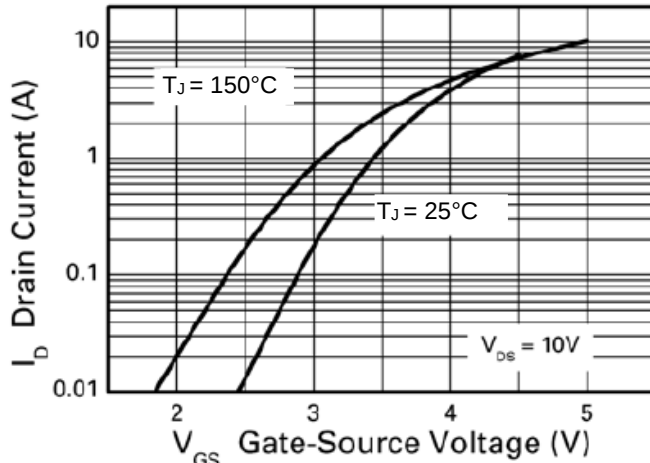
| Characteristic               | Symbol          | Value | Unit         |
|------------------------------|-----------------|-------|--------------|
| Junction to Ambient (Note 5) | $R_{\theta JA}$ | 62.5  | $^\circ C/W$ |
| Junction to Ambient (Note 6) | $R_{\theta JA}$ | 32    | $^\circ C/W$ |

## Electrical Characteristics (@ $T_A = +25^\circ C$ , unless otherwise specified.)

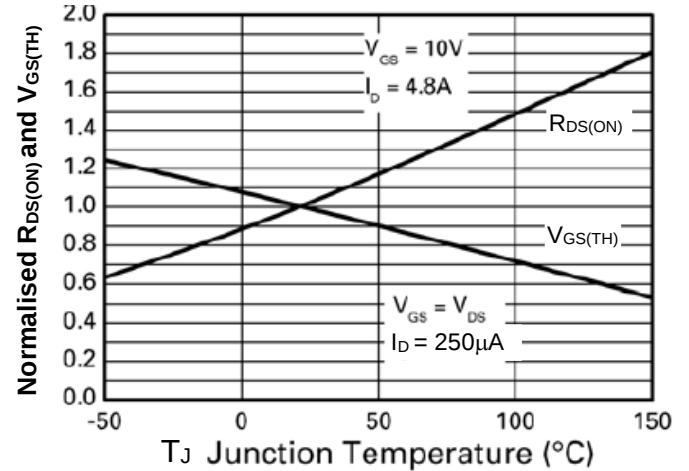
| Characteristic                          | Symbol              | Min | Typ  | Max  | Unit | Test Condition                                                                               |
|-----------------------------------------|---------------------|-----|------|------|------|----------------------------------------------------------------------------------------------|
| OFF CHARACTERISTICS                     |                     |     |      |      |      |                                                                                              |
| Drain-Source Breakdown Voltage          | BV <sub>DSS</sub>   | 60  | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                                 |
| 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   | —    | —    | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                   |
| Static Drain-Source On-State Resistance | R <sub>DS(ON)</sub> | —   | 0.06 | 0.08 | Ω    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 4.8A                                                 |
|                                         |                     | —   | 0.08 | 0.15 | Ω    | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 4.2A                                                |
| Forward Transconductance (Note 9)       | g <sub>fs</sub>     | —   | 6.6  | —    | S    | V <sub>DS</sub> = 15V, I <sub>D</sub> = 4.8A                                                 |
| Diode Forward Voltage                   | V <sub>SD</sub>     | —   | 0.88 | 1.2  | V    | T <sub>J</sub> = +25°C, I <sub>S</sub> = 4A, V <sub>GS</sub> = 0V                            |
| DYNAMIC CHARACTERISTICS (Note 9)        |                     |     |      |      |      |                                                                                              |
| Input Capacitance                       | C <sub>iss</sub>    | —   | 459  | —    | pF   | V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V, f = 1MHz                                        |
| Output Capacitance                      | C <sub>oss</sub>    | —   | 44.2 | —    | pF   |                                                                                              |
| Reverse Transfer Capacitance            | C <sub>rss</sub>    | —   | 24.1 | —    | pF   |                                                                                              |
| Turn-On Delay Time (Note 8)             | t <sub>D(ON)</sub>  | —   | 2.6  | —    | ns   | V <sub>DD</sub> = 30V, I <sub>D</sub> = 1.5A<br>R <sub>G</sub> ≅ 6.0Ω, V <sub>GS</sub> = 10V |
| Turn-On Rise Time (Note 8)              | t <sub>r</sub>      | —   | 2.1  | —    | ns   |                                                                                              |
| Turn-Off Delay Time (Note 8)            | t <sub>D(OFF)</sub> | —   | 12.3 | —    | ns   |                                                                                              |
| Turn-Off Fall Time (Note 8)             | t <sub>f</sub>      | —   | 4.6  | —    | ns   |                                                                                              |
| Gate Charge (Note 8)                    | Q <sub>G</sub>      | —   | 4.0  | —    | nC   | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 5V<br>I <sub>D</sub> = 1.4A                         |
| Total Gate Charge (Note 8)              | Q <sub>G</sub>      | —   | 5.8  | —    | nC   | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 10V<br>I <sub>D</sub> = 1.4A                        |
| Gate-Source Charge (Note 8)             | Q <sub>GS</sub>     | —   | 1.4  | —    | nC   |                                                                                              |
| Gate Drain Charge (Note 8)              | Q <sub>GD</sub>     | —   | 1.9  | —    | nC   |                                                                                              |
| SOURCE-DRAIN DIODE                      |                     |     |      |      |      |                                                                                              |
| Reverse Recovery Time (Note 9)          | t <sub>RR</sub>     | —   | 19.2 | —    | ns   | T <sub>J</sub> = +25°C, I <sub>S</sub> = 1.4A, di/dt = 100A/μs                               |
| Reverse Recovery Charge (Note 9)        | Q <sub>RR</sub>     | —   | 30.3 | —    | nC   |                                                                                              |

- Notes:
5. For a device surface mounted on 25mm  $\times$  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  $t \leq 10s$ .
  7. Repetitive rating - 25mm  $\times$  25mm FR-4 PCB,  $D = 0.02$ , pulse width 300 $\mu s$  - pulse width limited by maximum junction temperature.
  8. Switching characteristics are independent of operating junction temperature.
  9. For design aid only, not subject to production testing.

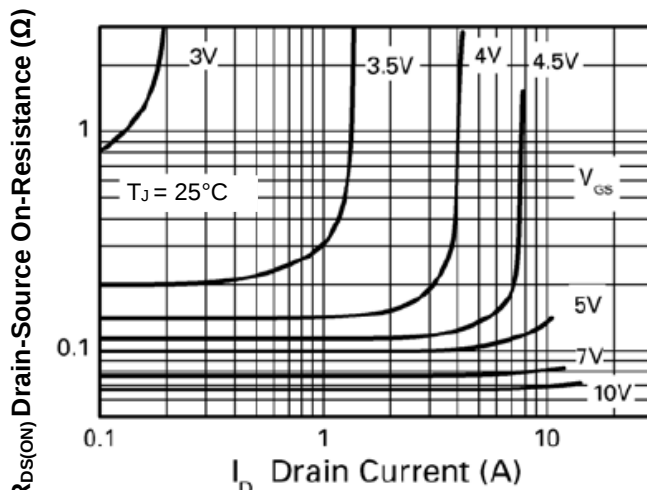




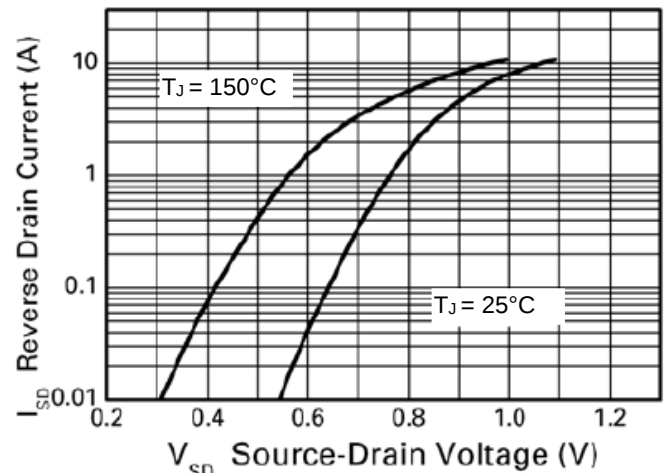
**Typical Transfer Characteristics**



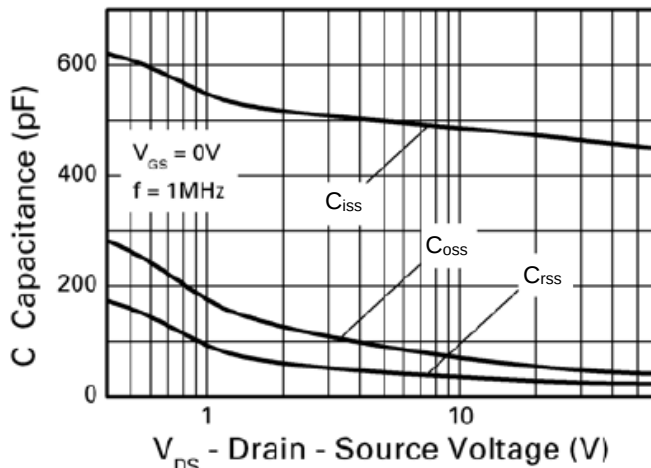
**Normalised Curves v Temperature**



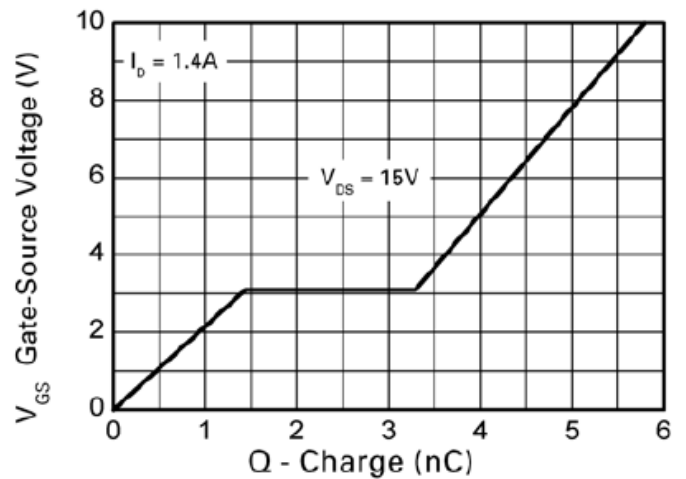
**On-Resistance v Drain Current**



**Source-Drain Diode Forward Voltage**

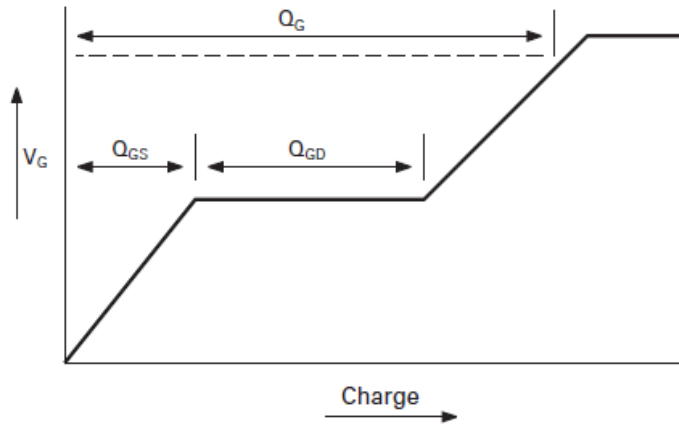


**Capacitance v Drain-Source Voltage**

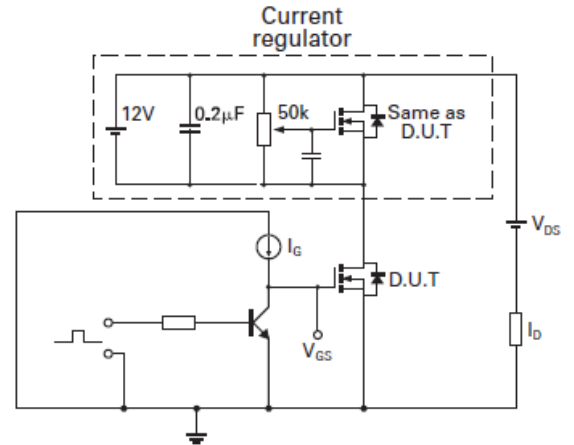


**Gate-Source Voltage v Gate Charge**

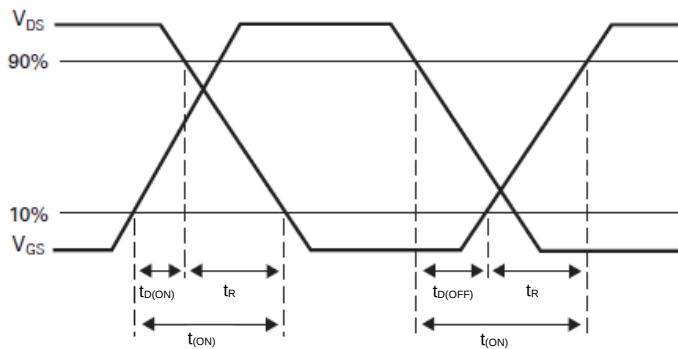
## Test Circuits



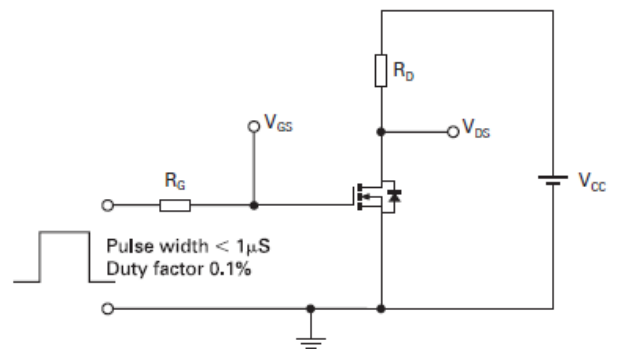
**Basic gate charge waveform**



**Gate charge test circuit**



**Switching time waveforms**

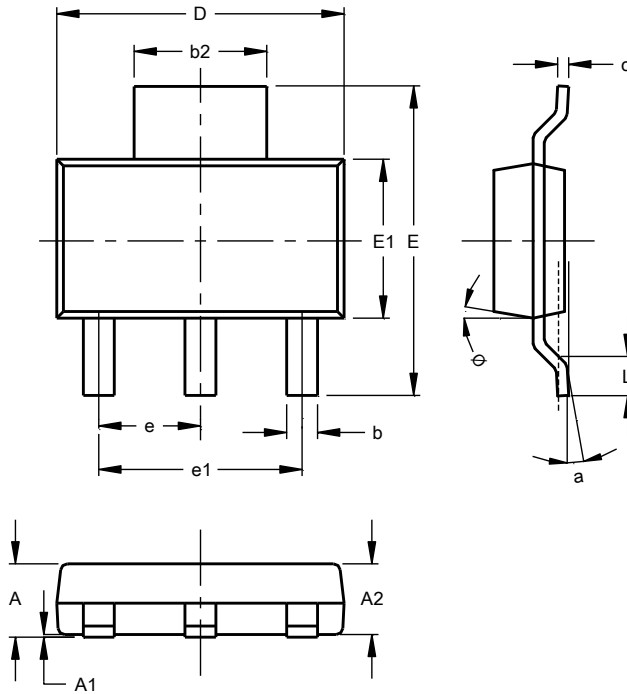


**Switching time test circuit**

## Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

### SOT223 (Type ZN)

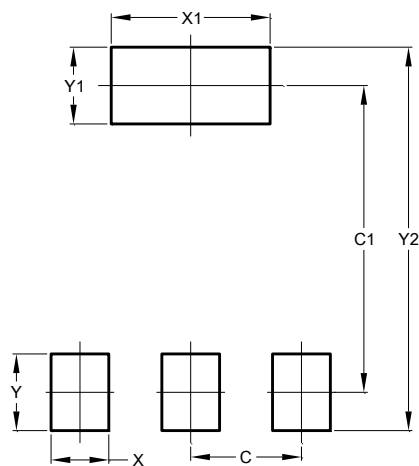


| SOT223 (Type ZN)     |          |      |      |
|----------------------|----------|------|------|
| Dim                  | Min      | Max  | Typ  |
| A                    | --       | 1.70 | --   |
| A1                   | 0.02     | 0.10 | --   |
| A2                   | 1.50     | 1.68 | 1.60 |
| b                    | 0.60     | 0.80 | --   |
| b2                   | 2.90     | 3.10 | --   |
| c                    | 0.24     | 0.32 | --   |
| D                    | 6.30     | 6.70 | --   |
| E                    | 6.70     | 7.30 | --   |
| E1                   | 3.30     | 3.70 | --   |
| e                    | 2.30 NOM |      |      |
| e1                   | 4.60 NOM |      |      |
| L                    | 0.90     | --   | --   |
| a                    | --       | --   | 10°  |
| Θ                    | --       | 15°  | --   |
| All Dimensions in mm |          |      |      |

## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

### SOT223 (Type ZN)



| 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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