

## 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
- **Lead-Free Finish; 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 switches

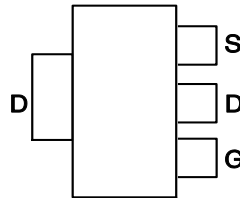
## Mechanical Data

- Package: SOT223
- Package 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 208 (E3)
- Weight: 0.112 grams (Approximate)

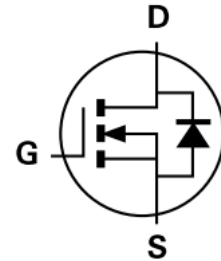
SOT223 (Type DN)



Top View



Pinout - Top View



Equivalent Circuit

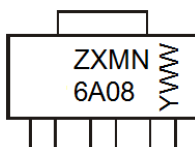
## Ordering Information (Note 4)

| Orderable Part Number | Package          | Packing |             |
|-----------------------|------------------|---------|-------------|
|                       |                  | Qty.    | Carrier     |
| ZXMN6A08GQTA          | SOT223 (Type DN) | 1000    | Tape & Reel |
| ZXMN6A08GQTC          | SOT223 (Type DN) | 4000    | Tape & Reel |

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  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 DN)



ZXMN6A08 = Product Type Marking Code  
YWW = Date Code Marking  
Y = Last Digit of Year (ex: 5 = 2025)  
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 5) | A               |
|                                                    |                | $T_A = +70^{\circ}C$ (Note 5) | A               |
|                                                    |                | $T_A = +25^{\circ}C$ (Note 6) | A               |
| Pulsed Drain Current (Note 7)                      | $I_{DM}$       | 20                            | A               |
| Continuous Source Current (Body Diode) (Note 5)    | $I_S$          | 2.1                           | A               |
| Pulsed Source Current (Body Diode) (Note 7)        | $I_{SM}$       | 20                            | A               |
| Power Dissipation at $T_A = +25^{\circ}C$ (Note 6) | $P_D$          | 2                             | W               |
| Linear Derating Factor                             |                | 16                            | mW/ $^{\circ}C$ |
| Power Dissipation at $T_A = +25^{\circ}C$ (Note 5) | $P_D$          | 3.9                           | W               |
| Linear Derating Factor                             |                | 31                            | mW/ $^{\circ}C$ |
| Operating and Storage Temperature Range            | $T_J, T_{STG}$ | -55 to +150                   | $^{\circ}C$     |

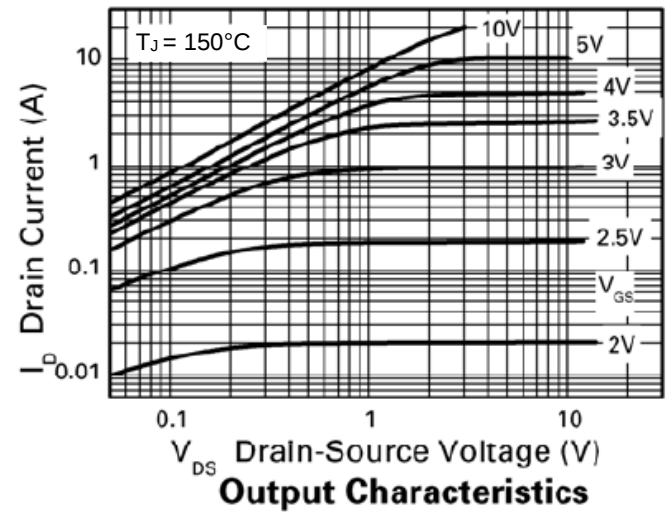
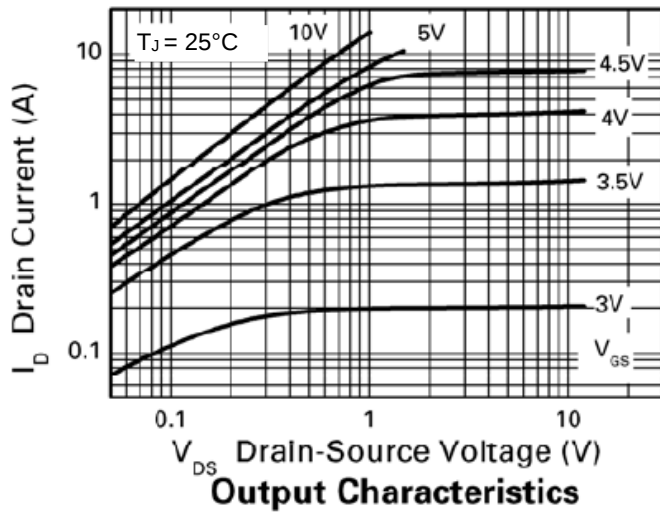
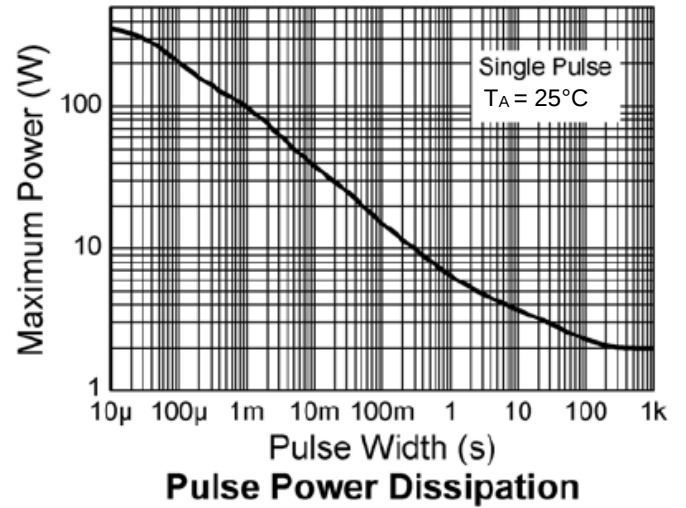
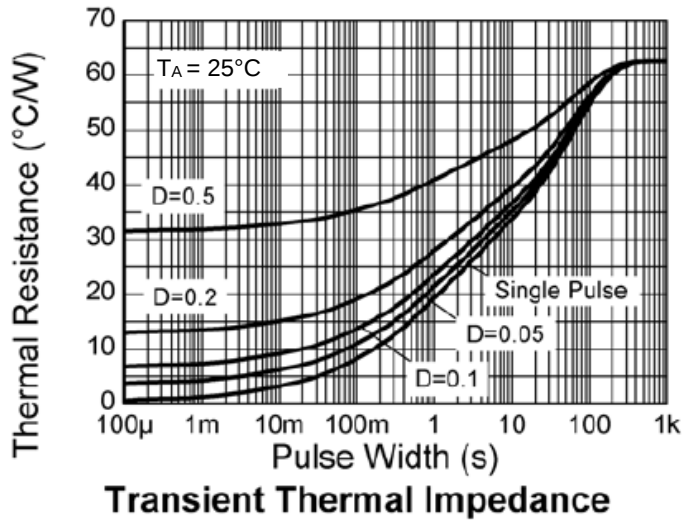
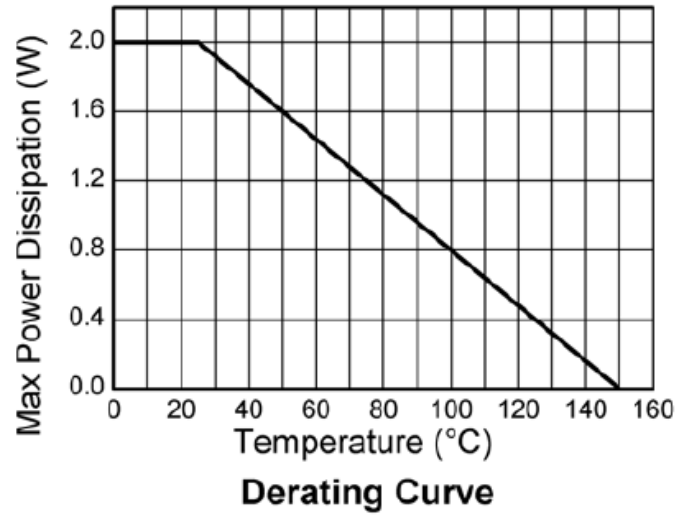
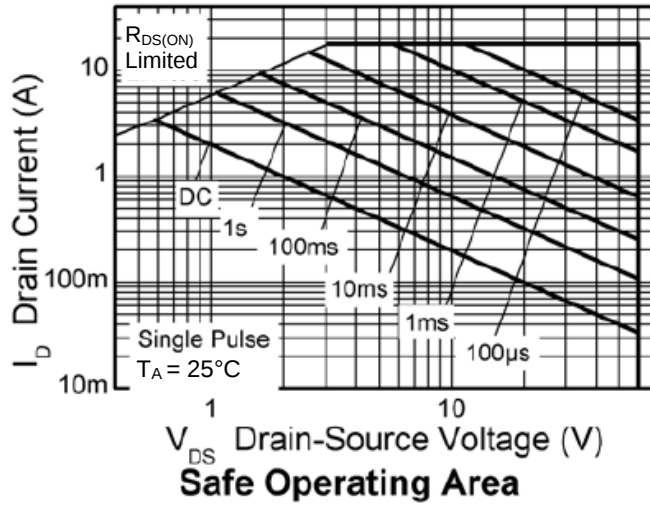
## Thermal Characteristics (@ $T_A = +25^{\circ}C$ , unless otherwise specified.)

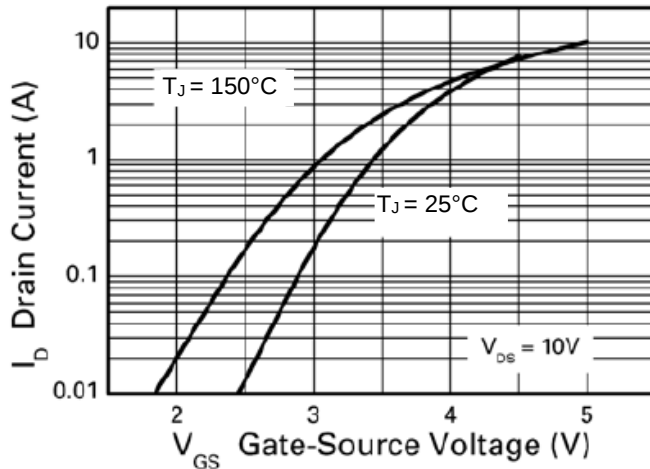
| Characteristic               | Symbol          | Value | Unit          |
|------------------------------|-----------------|-------|---------------|
| Junction to Ambient (Note 6) | $R_{\theta JA}$ | 62.5  | $^{\circ}C/W$ |
| Junction to Ambient (Note 5) | $R_{\theta JA}$ | 32    | $^{\circ}C/W$ |

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

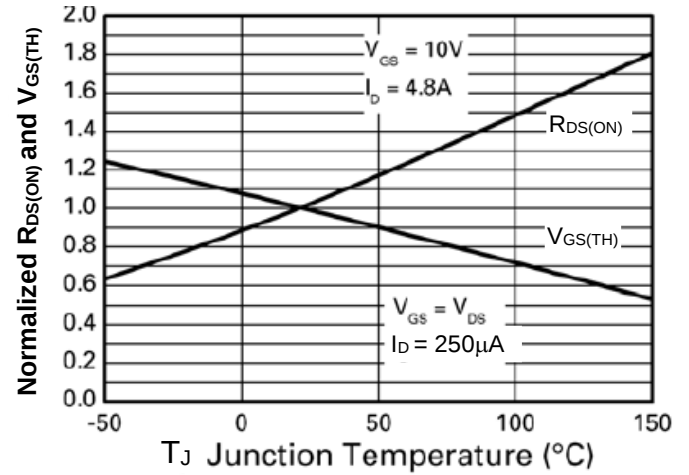
| Characteristic                          | Symbol              | Min | Typ  | Max  | Unit | Test Condition                                                                              |
|-----------------------------------------|---------------------|-----|------|------|------|---------------------------------------------------------------------------------------------|
| 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 8)       | 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<br>V <sub>GS</sub> = 0V                         |
| DYNAMIC CHARACTERISTICS (Note 8)        |                     |     |      |      |      |                                                                                             |
| Input Capacitance                       | C <sub>iSS</sub>    | —   | 459  | —    | pF   | V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V<br>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 9)             | 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 9)              | t <sub>r</sub>      | —   | 2.1  | —    | ns   |                                                                                             |
| Turn-Off Delay Time (Note 9)            | t <sub>D(OFF)</sub> | —   | 12.3 | —    | ns   |                                                                                             |
| Turn-Off Fall Time (Note 9)             | t <sub>f</sub>      | —   | 4.6  | —    | ns   |                                                                                             |
| Gate Charge (Note 9)                    | 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 9)              | 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 9)             | Q <sub>GS</sub>     | —   | 1.4  | —    | nC   |                                                                                             |
| Gate Drain Charge (Note 9)              | Q <sub>GD</sub>     | —   | 1.9  | —    | nC   |                                                                                             |
| SOURCE-DRAIN DIODE                      |                     |     |      |      |      |                                                                                             |
| Reverse-Recovery Time (Note 8)          | t <sub>RR</sub>     | —   | 19.2 | —    | ns   | T <sub>J</sub> = +25°C, I <sub>S</sub> = 1.4A<br>di/dt = 100A/μs                            |
| Reverse-Recovery Charge (Note 8)        | Q <sub>RR</sub>     | —   | 30.3 | —    | nC   |                                                                                             |

- Notes:
5. For a device surface-mounted on FR-4 PCB measured at  $t \leq 10s$ .
  6. For a device surface-mounted on 25mm  $\times$  25mm FR-4 PCB with high coverage of single-sided 1oz copper, in still air conditions.
  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. For design aid only, not subject to production testing.
  9. Switching characteristics are independent of operating junction temperature.

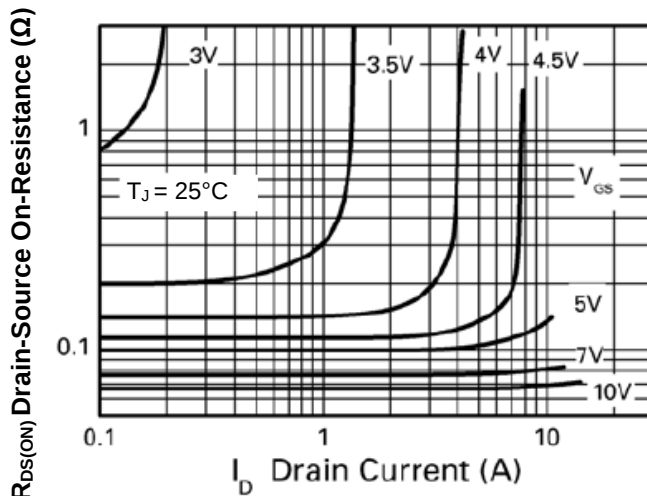




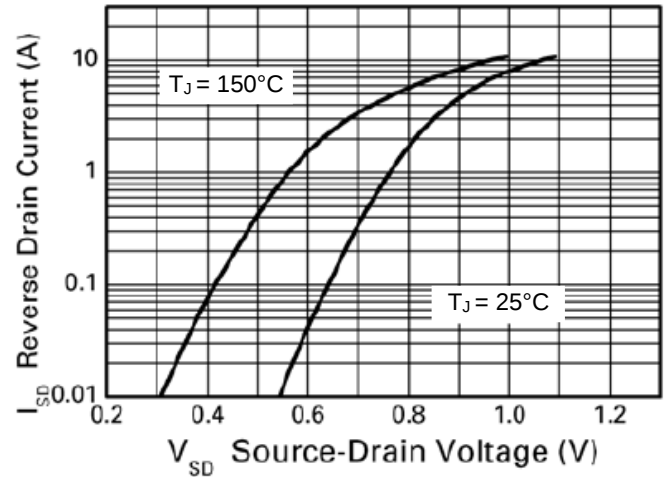
**Typical Transfer Characteristics**



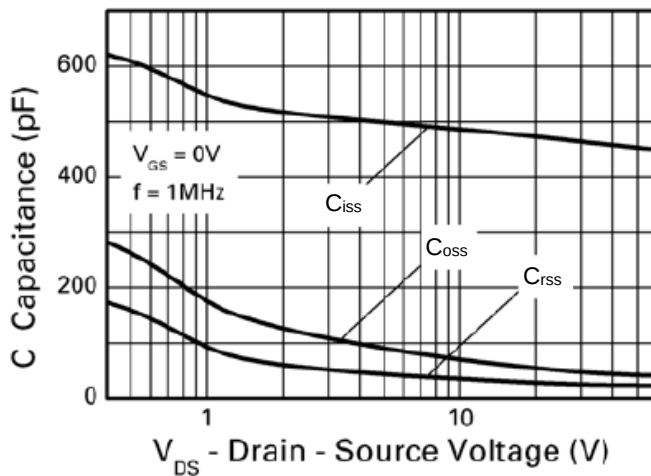
**Normalised Curves v Temperature**



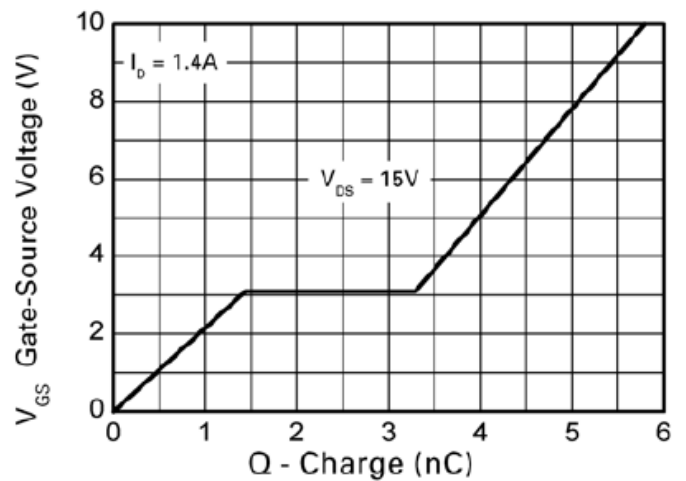
**On-Resistance v Drain Current**



**Source-Drain Diode Forward Voltage**

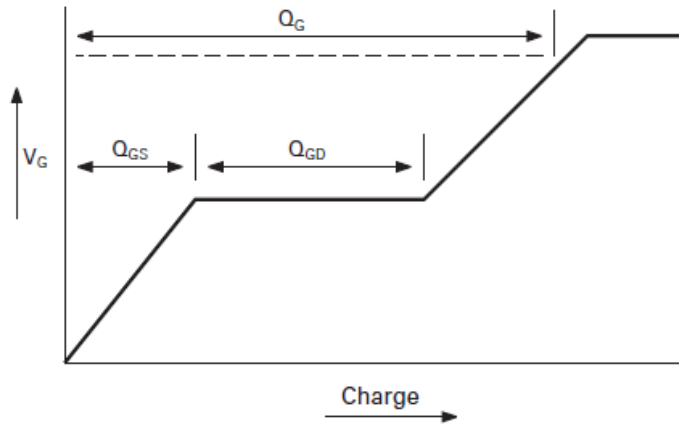


**Capacitance v Drain-Source Voltage**

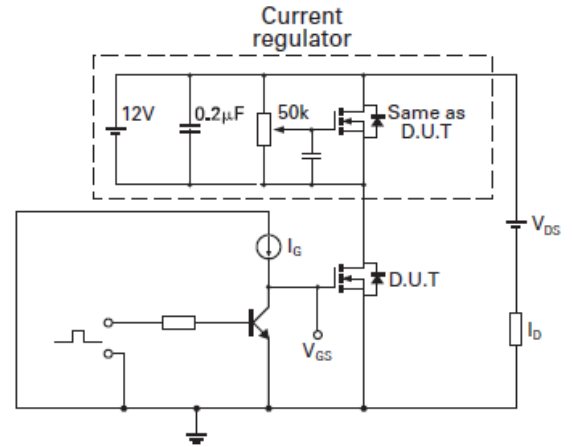


**Gate-Source Voltage v Gate Charge**

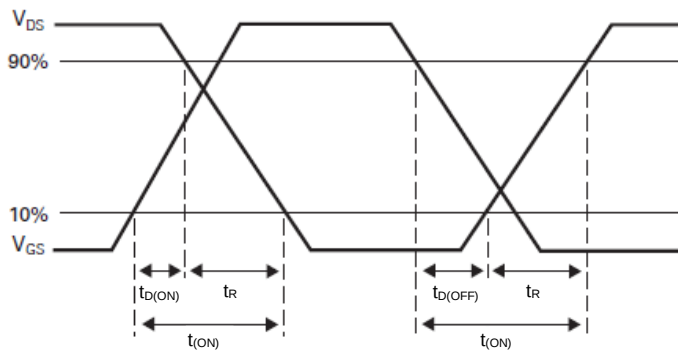
## Test Circuits



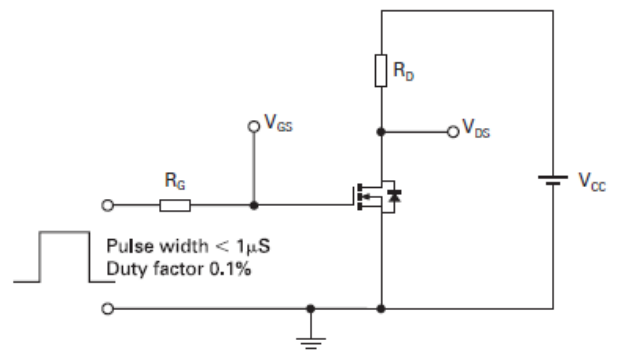
**Basic gate charge waveform**



**Gate charge test circuit**



**Switching time waveforms**

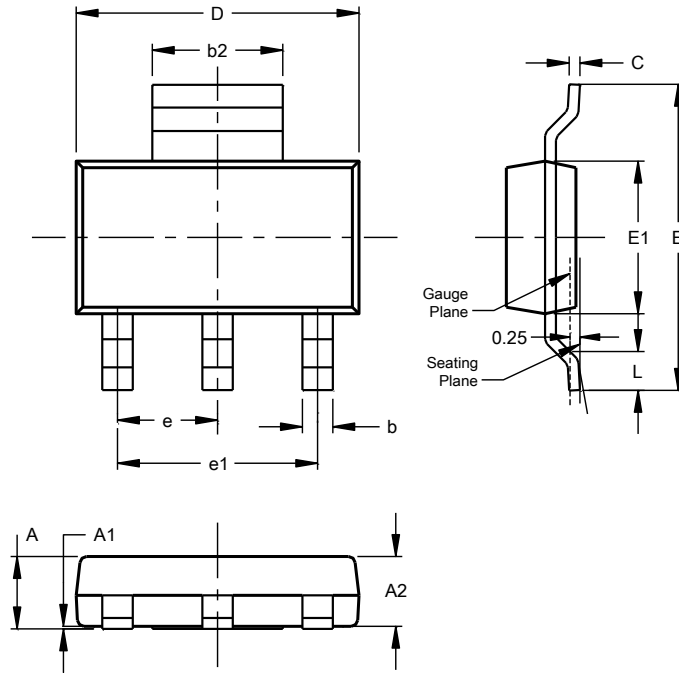


**Switching time test circuit**

## Package Outline Dimensions

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

**SOT223 (Type DN)**

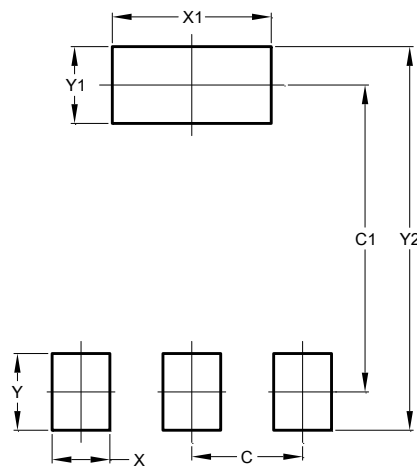


| SOT223 (Type DN)     |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | --   | 1.70 | --   |
| A1                   | 0.01 | 0.15 | --   |
| A2                   | 1.50 | 1.68 | 1.60 |
| b                    | 0.60 | 0.80 | 0.70 |
| b2                   | 2.90 | 3.10 | --   |
| c                    | 0.20 | 0.32 | --   |
| D                    | 6.30 | 6.70 | --   |
| E                    | 6.70 | 7.30 | --   |
| E1                   | 3.30 | 3.70 | --   |
| e                    | --   | --   | 2.30 |
| e1                   | --   | --   | 4.60 |
| L                    | 0.85 | --   | --   |
| All Dimensions in mm |      |      |      |

## Suggested Pad Layout

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

**SOT223 (Type DN)**



| 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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