# ZXMN10A11G

## 100V N-CHANNEL ENHANCEMENT MODE MOSFET

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ | $I_D$ $T_A$ = 25°C |
|---|---|---|
| 100V | 350mΩ @ $V_{GS}$ = 10V | 2.4A |
| | 450mΩ @ $V_{GS}$ = 6.0V | 2.1A |

## 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

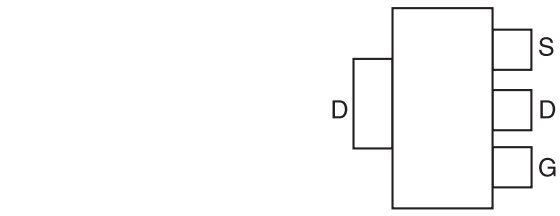
## Features and Benefits

- Fast switching speed
- Low gate drive
- Low input capacitance
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

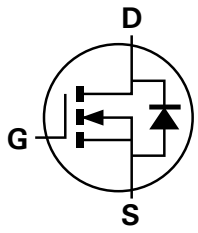
- Case: SOT223
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.112 grams (approximate)

SOT223




Top View

Pin Out - Top View

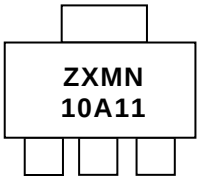



Equivalent Circuit

## Ordering Information

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|
| ZXMN10A11GTA | See below | 7 | 12 | 1,000 |

## Marking Information




ZXMN = Product Type Marking Code, Line 1
10A11 = Product Type Marking Code, Line 2

## Maximum Ratings @$T_A$ = 25°C unless otherwise specified

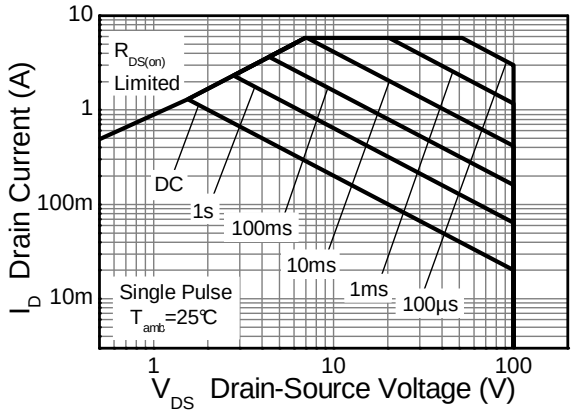
| Characteristic | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain-Source voltage | | | $V_{DSS}$ | 100 | V |
| Gate-Source voltage | | | $V_{GS}$ | ±20 | V |
| Continuous Drain current | $V_{GS}$ = 10V | (Note 2) | $I_D$ | 2.4 | A |
| | | $T_A$ = 70°C (Note 2) | | 1.9 | |
| | | (Note 1) | | 1.7 | |
| Pulsed Drain current | $V_{GS}$= 10V | (Note 3) | $I_{DM}$ | 7.9 | A |
| Continuous Source current (Body diode) | | (Note 2) | $I_S$ | 4.6 | A |
| Pulsed Source current (Body diode) | | (Note3 ) | $I_{SM}$ | 7.9 | A |

## Thermal Characteristics @$T_A$ = 25°C unless otherwise specified

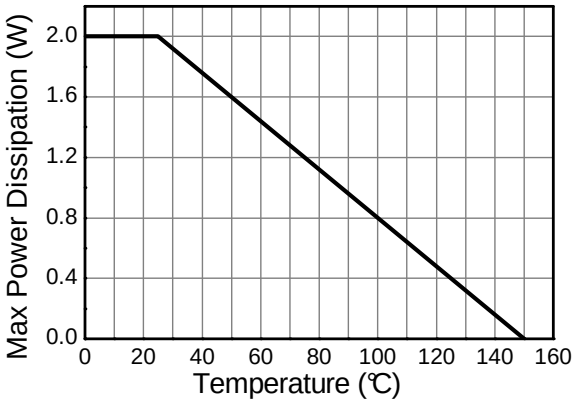
| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power dissipation | (Note 1) | $P_D$ | 2.0 | W |
| Linear derating factor | | | 16 | mW/°C |
| | (Note 2) | | 3.9 | W |
| | | | 31 | mW/°C |
| Thermal Resistance, Junction to Ambient | (Note 1) | $R_{\theta JA}$ | 62.5 | °C/W |
| | (Note 2) | | 32.0 | |
| Thermal Resistance, Junction to Lead | (Note 4) | $R_{\theta JL}$ | 9.8 | °C/W |
| Operating and storage temperature range | | $T_J$, $T_{STG}$ | -55 to 150 | °C |

Notes:
1. 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.
2. Same as note (1), except the device is measured at t ≤ 10 sec.
3. Same as note (1), except the device is pulsed with D = 0.02 and pulse width 300µs. The pulse current is limited by the maximum junction temperature.
4. Thermal resistance from junction to solder-point (at the end of the drain lead)

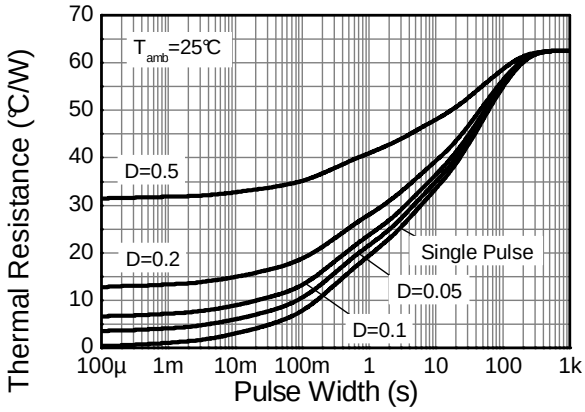
## Thermal Characteristics



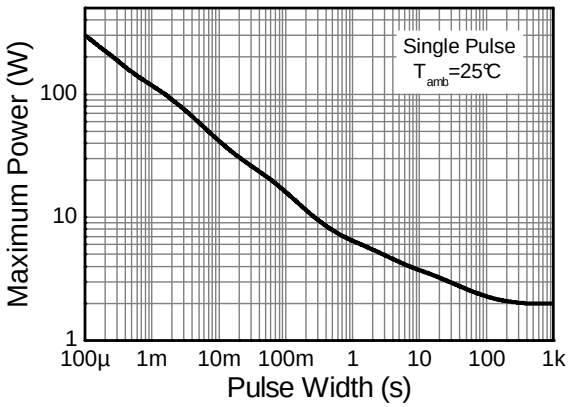

**Safe Operating Area**




**Derating Curve**




**Transient Thermal Impedance**



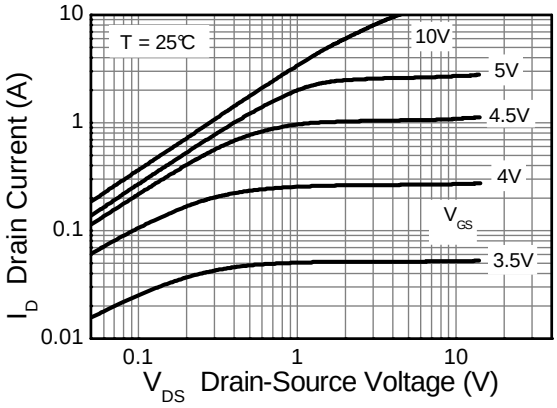

**Pulse Power Dissipation**

## Electrical Characteristics @$T_A$ = 25°C unless otherwise specified

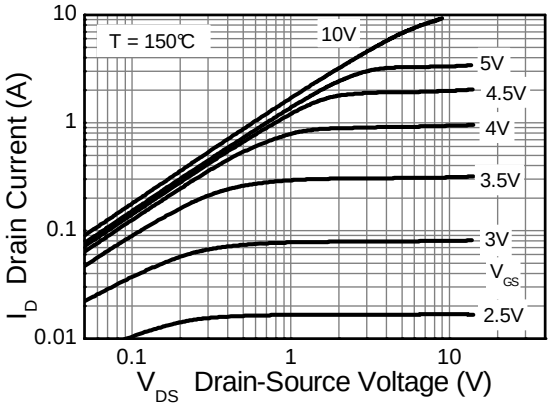
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 100 | — | — | V | $I_D$ = 250μA, $V_{GS}$ = 0V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 1 | μA | $V_{DS}$ = 100V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±100 | nA | $V_{GS}$ = ±20V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 2.0 | — | 4.0 | V | $I_D$ = 250μA, $V_{DS}$ = $V_{GS}$ |
| Static Drain-Source On-Resistance (Note 5) | $R_{DS\ (ON)}$ | — | — | 0.35 | Ω | $V_{GS}$ = 10V, $I_D$ = 2.6A |
| | | | | 0.45 | | $V_{GS}$ = 6V, $I_D$ = 1.3A |
| Forward Transconductance (Notes 5 & 6) | $g_{fs}$ | — | 4 | — | S | $V_{DS}$ = 15V, $I_D$ = 2.6A |
| Diode Forward Voltage (Note 5) | $V_{SD}$ | — | 0.85 | 0.95 | V | $I_S$ = 1.85A, $V_{GS}$ = 0V |
| Reverse recovery time (Note 6) | $t_{rr}$ | | 26 | — | ns | $I_F$ = 1.0A, di/dt = 100A/μs |
| Reverse recovery charge (Note 6) | $Q_{rr}$ | — | 30 | — | nC | |
| **DYNAMIC CHARACTERISTICS (Note 6)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 274 | — | pF | $V_{DS}$ = 50V, $V_{GS}$ = 0V<br>f = 1MHz |
| Output Capacitance | $C_{oss}$ | — | 21 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 11 | — | pF | |
| Total Gate Charge (Note 7) | $Q_g$ | — | 3.5 | — | nC | $V_{GS}$ = 6.0V; $V_{DS}$ = 50V, $I_D$ = 2.5A |
| Total Gate Charge (Note 7) | $Q_g$ | — | 5.4 | — | nC | $V_{GS}$ = 10V; $V_{DS}$ = 50V, $I_D$ = 2.5A |
| Gate-Source Charge (Note 7) | $Q_{gs}$ | — | 1.4 | — | nC | |
| Gate-Drain Charge (Note 7) | $Q_{gd}$ | — | 1.5 | — | nC | |
| Turn-On Delay Time (Note 7) | $t_{D(on)}$ | — | 2.7 | — | ns | $V_{DD}$ = 50V, $V_{GS}$ = 10V<br>$I_D$ = 1A, $R_G \cong$ 6.0Ω |
| Turn-On Rise Time (Note 7) | $t_r$ | — | 1.7 | — | ns | |
| Turn-Off Delay Time (Note 7) | $t_{D(off)}$ | — | 7.4 | — | ns | |
| Turn-Off Fall Time (Note 7) | $t_f$ | — | 3.5 | — | ns | |

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

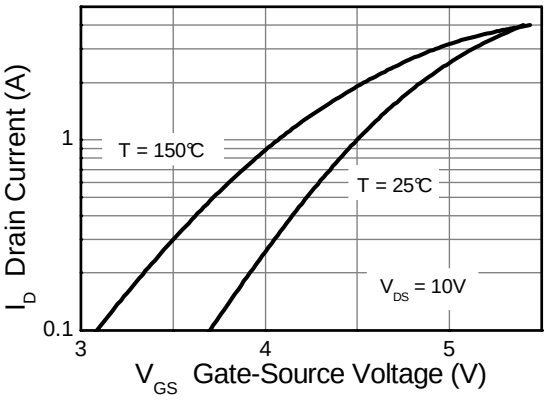
## Typical Characteristics



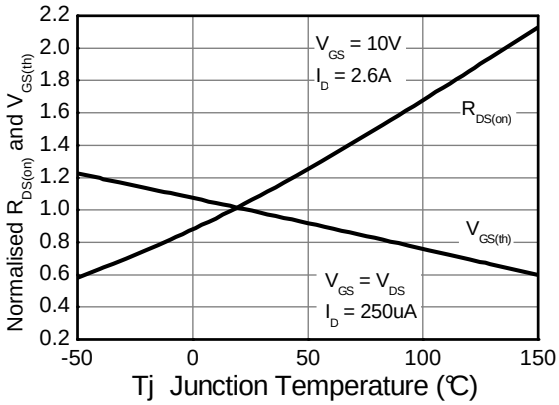

**Output Characteristics**



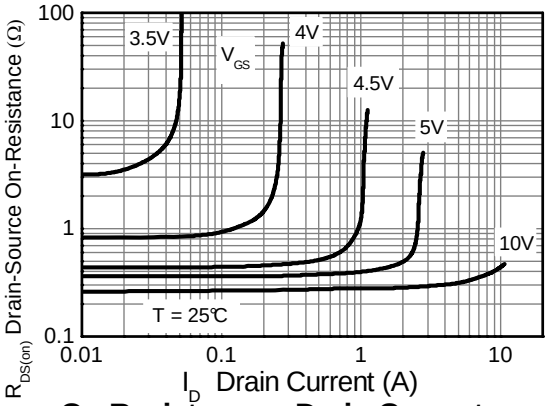

**Output Characteristics**



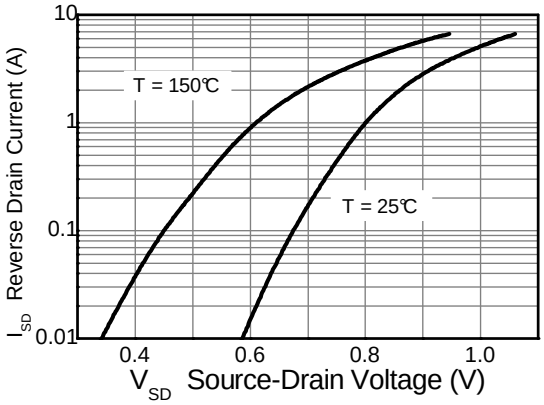

**Typical Transfer Characteristics**




**Normalised Curves v Temperature**

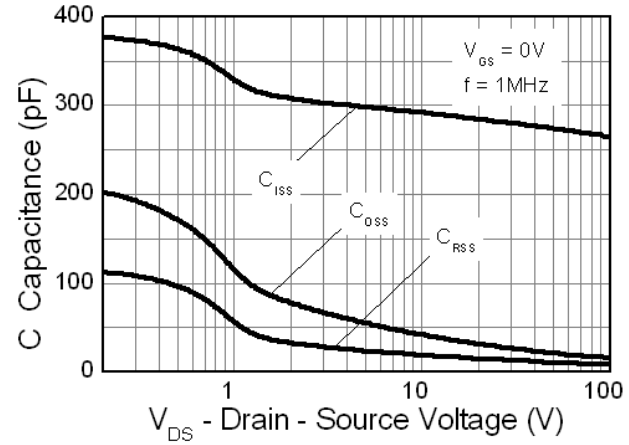



**On-Resistance v Drain Current**

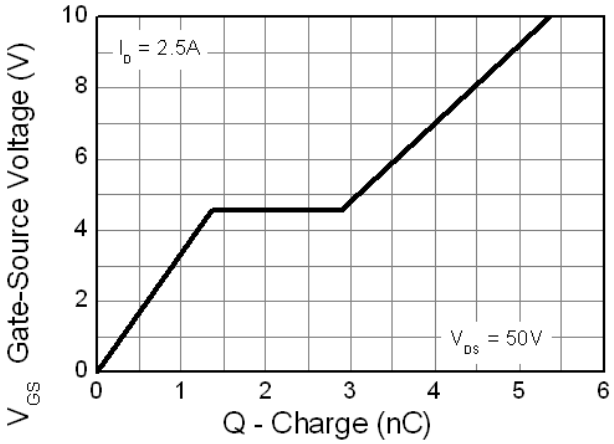



**Source-Drain Diode Forward Voltage**

## Typical Characteristics - continued

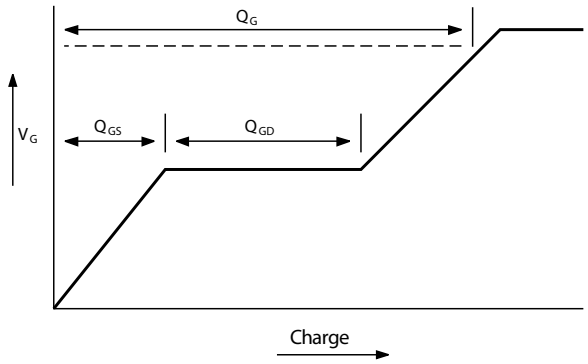



Capacitance v Drain-Source Voltage

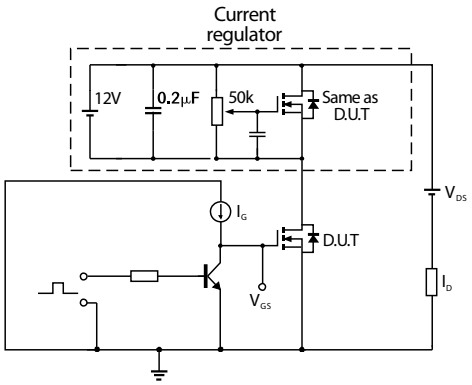



Gate-Source Voltage v Gate Charge

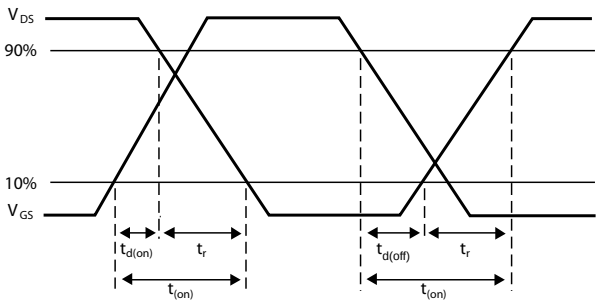
## Test Circuits



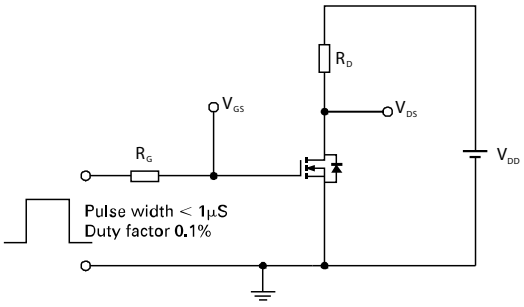

Basic gate charge waveform




Gate charge test circuit

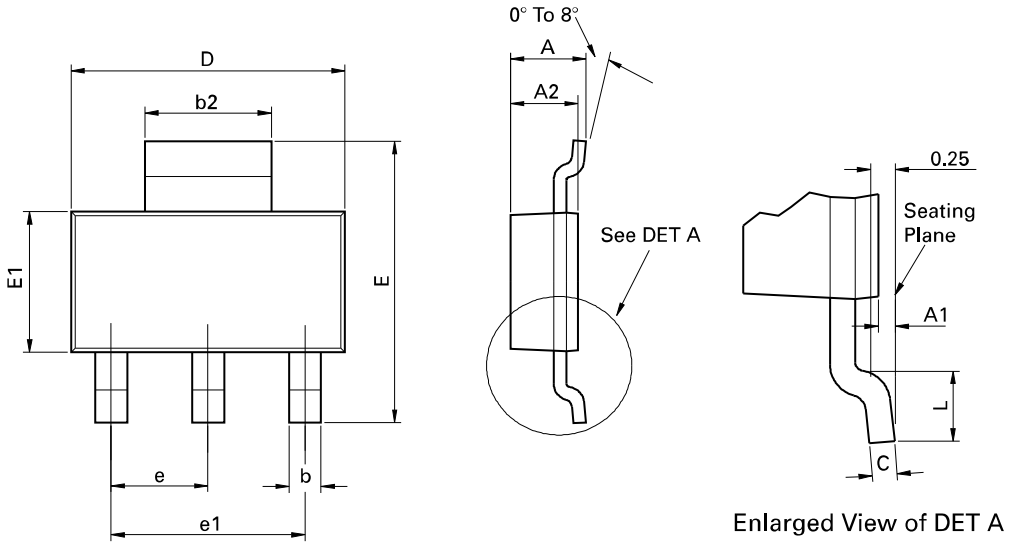



Switching time waveforms




Switching time test circuit

## Package Outline Dimensions

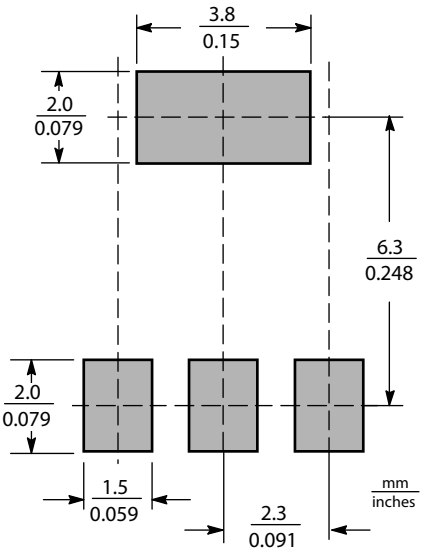



Enlarged View of DET A

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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