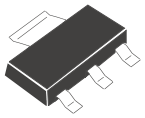
# ZXMN6A11G

## 60V N-CHANNEL ENHANCEMENT MODE MOSFET

SUMMARY

$V_{(BR)DSS}$=60V; $R_{DS(ON)}$=0.15Ω $I_D$=3.8A



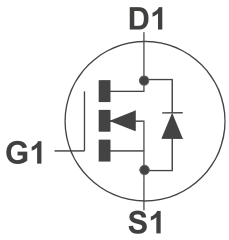
SOT223

**DESCRIPTION**

This new generation of TRENCH MOSFETs from Zetex utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage, power management applications.

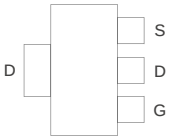
**FEATURES**

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- Low profile SOIC package




**APPLICATIONS**

- DC - DC Converters
- Power Management Functions
- Disconnect switches
- Motor control




Top View

**ORDERING INFORMATION**

| DEVICE | REEL SIZE | TAPE WIDTH | QUANTITY PER REEL |
|---|---|---|---|
| ZXMN6A11GTA | 7” | 12mm | 1000 units |
| ZXMN6A11GTC | 13” | 12mm | 4000 units |

**DEVICE MARKING**

- ZXMN
  6A11

# ZXMN6A11G

## ABSOLUTE MAXIMUM RATINGS.

| PARAMETER | SYMBOL | LIMIT | UNIT |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 60 | V |
| Gate Source Voltage | $V_{GS}$ | ±20 | V |
| Continuous Drain Current ($V_{GS}$=10V; $T_A$=25°C)(b)<br>($V_{GS}$=10V; $T_A$=70°C)(b)<br>($V_{GS}$=10V; $T_A$=25°C)(a) | $I_D$ | 3.8<br>3.0<br>2.7 | A |
| Pulsed Drain Current (c) | $I_{DM}$ | 10 | A |
| Continuous Source Current (Body Diode) (b) | $I_S$ | 5.0 | A |
| Pulsed Source Current (Body Diode)(c) | $I_{SM}$ | 10 | A |
| Power Dissipation at $T_A$=25°C (a)<br>Linear Derating Factor | $P_D$ | 2.0<br>16 | W<br>mW/°C |
| Power Dissipation at $T_A$=25°C (b)<br>Linear Derating Factor | $P_D$ | 3.9<br>31 | W<br>mW/°C |
| Operating and Storage Temperature Range | $T_j$:$T_{stg}$ | -55 to +150 | °C |

## THERMAL RESISTANCE

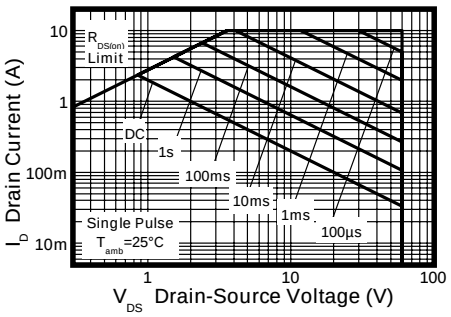
| PARAMETER | SYMBOL | VALUE | UNIT |
|---|---|---|---|
| Junction to Ambient (a) | $R_{\theta JA}$ | 62.5 | °C/W |
| Junction to Ambient (b) | $R_{\theta JA}$ | 32 | °C/W |

NOTES

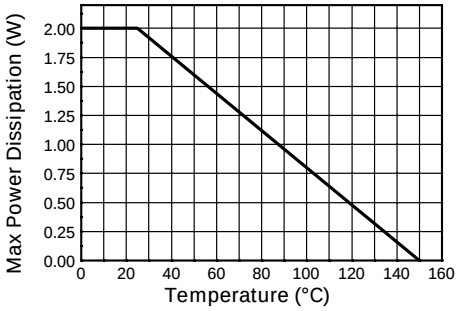
(a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions

(b) For a device surface mounted on FR4 PCB measured at t≤10 secs.

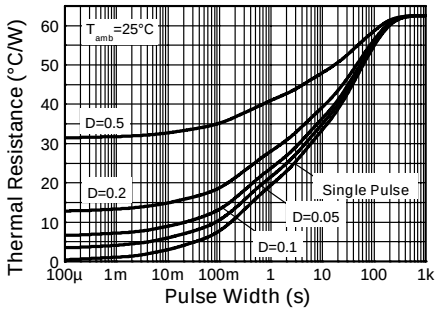
(c) Repetitive rating 25mm x 25mm FR4 PCB, D=0.05 pulse width=10µs - pulse width limited by maximum junction temperature.



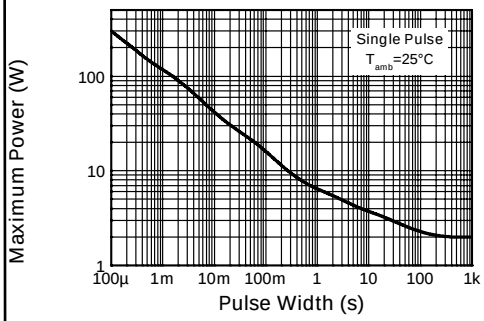

**Safe Operating Area**




**Derating Curve**




**Transient Thermal Impedance**



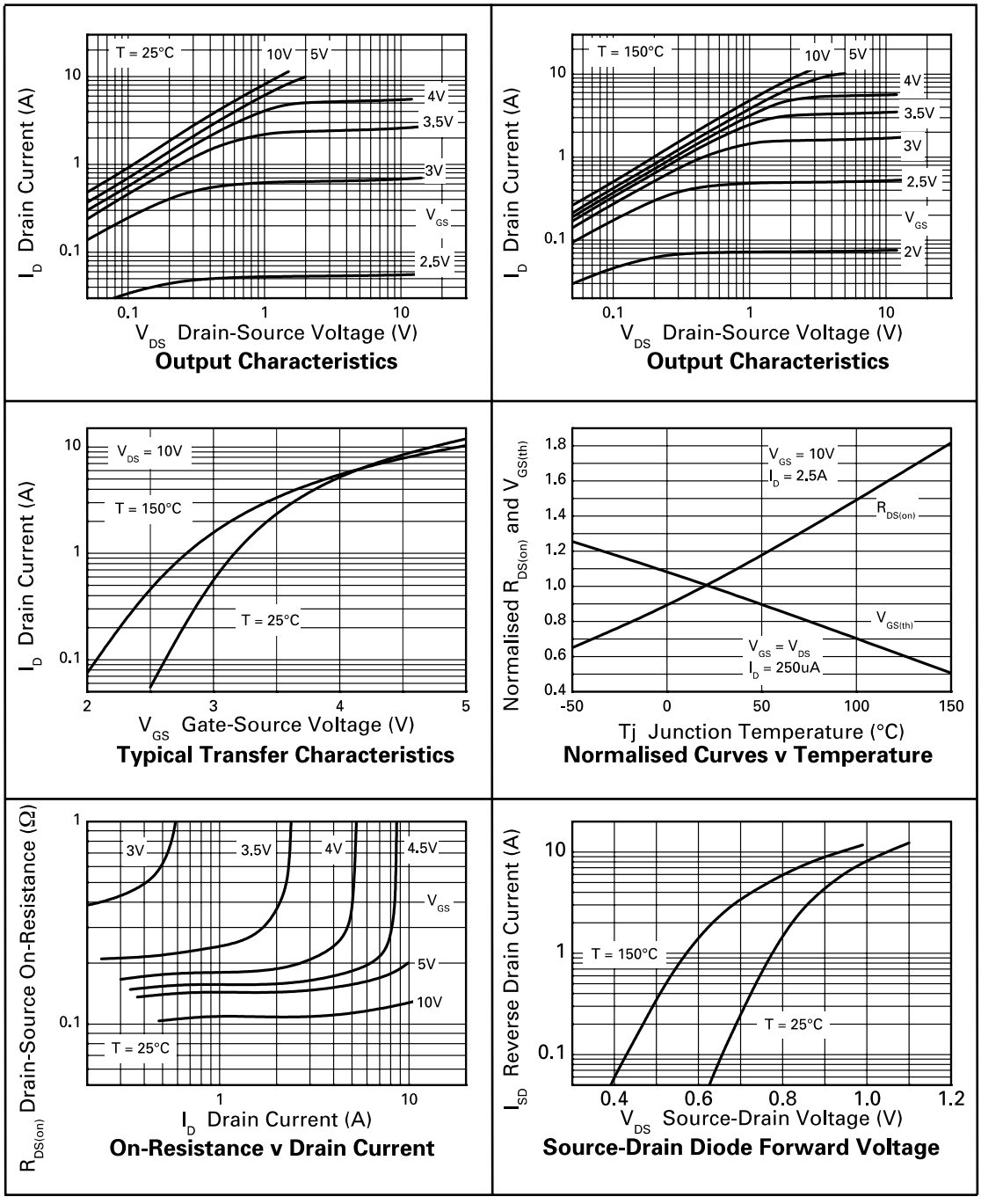

**Pulse Power Dissipation**

## ELECTRICAL CHARACTERISTICS (at $T_A$ = 25°C unless otherwise stated).

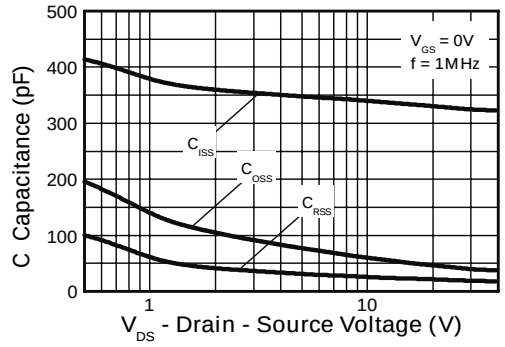
| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNIT | CONDITIONS. |
|---|---|---|---|---|---|---|
| **STATIC** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | 60 | | | V | $I_D$=250μA, $V_{GS}$=0V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | | | 1 | μA | $V_{DS}$=60V, $V_{GS}$=0V |
| Gate-Body Leakage | $I_{GSS}$ | | | 100 | nA | $V_{GS}$=±20V, $V_{DS}$=0V |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | 1.0 | | | V | $I_D$=250μA, $V_{DS}$= $V_{GS}$ |
| Static Drain-Source On-State Resistance (1) | $R_{DS(on)}$ | | | 0.150<br>0.250 | Ω<br>Ω | $V_{GS}$=10V, $I_D$=4.4A<br>$V_{GS}$=4.5V, $I_D$=3.8A |
| Forward Transconductance (3) | $g_{fs}$ | | 4.9 | | S | $V_{DS}$=15V,$I_D$=2.5A |
| **DYNAMIC** (3) | | | | | | |
| Input Capacitance | $C_{iss}$ | | 330 | | pF | $V_{DS}$=40 V, $V_{GS}$=0V, f=1MHz |
| Output Capacitance | $C_{oss}$ | | 35.2 | | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | | 17.1 | | pF | |
| **SWITCHING**(2) (3) | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | | 1.95 | | ns | $V_{DD}$ =30V, $I_D$=2.5A $R_G$=6.0Ω, $V_{GS}$=10V (refer to test circuit) |
| Rise Time | $t_r$ | | 3.5 | | ns | |
| Turn-Off Delay Time | $t_{d(off)}$ | | 8.2 | | ns | |
| Fall Time | $t_f$ | | 4.6 | | ns | |
| Gate Charge | $Q_g$ | | 3.0 | | nC | $V_{DS}$=15V,$V_{GS}$=5V, $I_D$=2.5A |
| Total Gate Charge | $Q_g$ | | 5.7 | | nC | $V_{DS}$=15V,$V_{GS}$=10V, $I_D$=2.5A (refer to test circuit) |
| Gate-Source Charge | $Q_{gs}$ | | 1.25 | | nC | |
| Gate-Drain Charge | $Q_{gd}$ | | 0.86 | | nC | |
| **SOURCE-DRAIN DIODE** | | | | | | |
| Diode Forward Voltage (1) | $V_{SD}$ | | 0.85 | 0.95 | V | $T_J$=25°C, $I_S$=2.8A, $V_{GS}$=0V |
| Reverse Recovery Time (3) | $t_{rr}$ | | 21.5 | | ns | $T_J$=25°C, $I_F$=2.5A, di/dt= 100A/μs |
| Reverse Recovery Charge (3) | $Q_{rr}$ | | 20.5 | | nC | |

NOTES
(1) Measured under pulsed conditions. Width=300μs. Duty cycle ≤ 2% .
(2) Switching characteristics are independent of operating junction temperature.
(3) For design aid only, not subject to production testing.

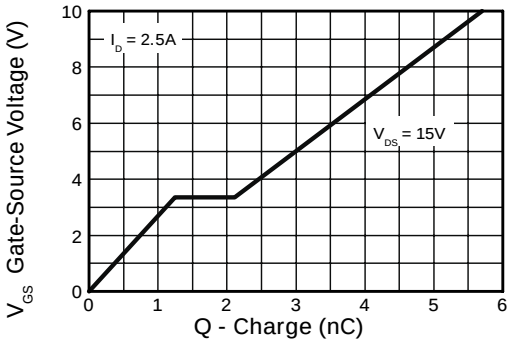
## TYPICAL CHARACTERISTICS



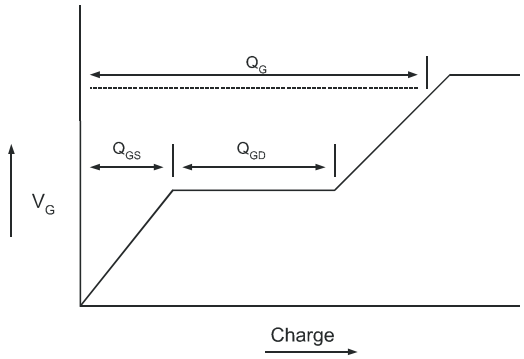
## TYPICAL CHARACTERISTICS



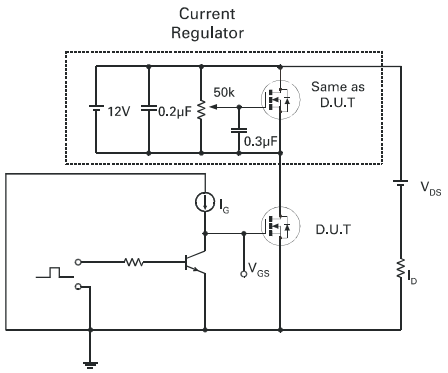

**Capacitance v Drain-Source Voltage**



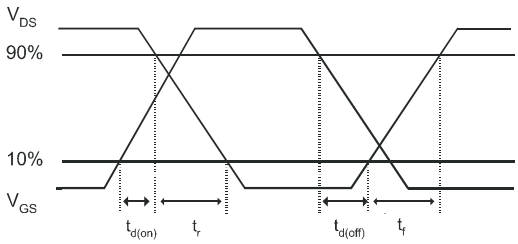

**Gate-Source Voltage v Gate Charge**



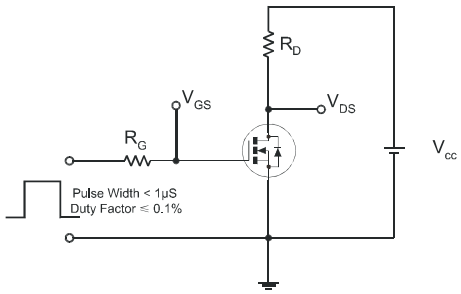

**Basic Gate Charge Waveform**




**Gate Charge Test Circuit**



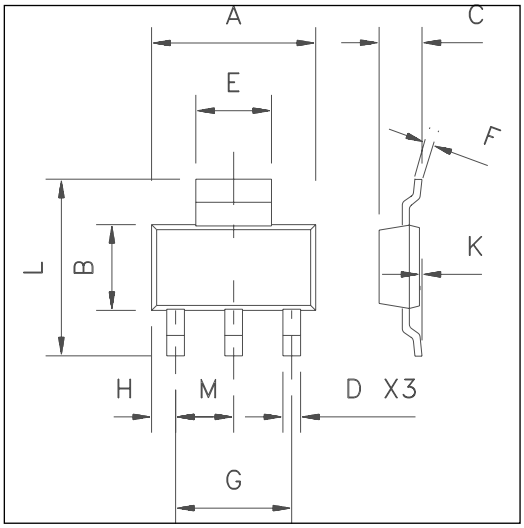

**Switching Time Waveforms**



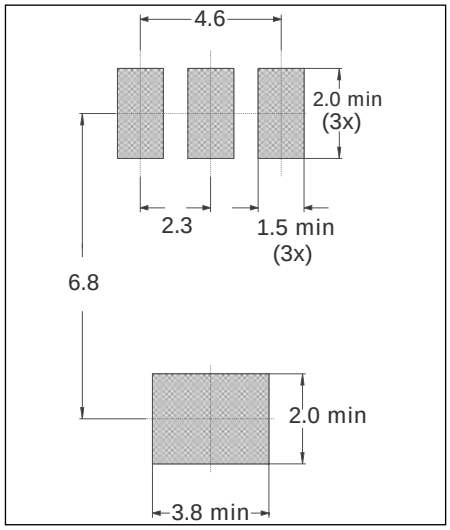

**Switching Time Test Circuit**

# ZXMN6A11G

## PACKAGE DIMENSIONS




## PAD LAYOUT DETAILS




| DIM | Millimetres | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 6.3 | 6.7 | 0.248 | 0.264 |
| B | 3.3 | 3.7 | 0.130 | 0.146 |
| C | - | 1.7 | - | 0.067 |
| D | 0.6 | 0.8 | 0.024 | 0.031 |
| E | 2.9 | 3.1 | 0.114 | 0.122 |
| F | 0.24 | 0.32 | 0.009 | 0.13 |
| G | NMO 4.6 | | NOM 0.181 | |
| H | 0.85 | 1.05 | 0.033 | 0.041 |
| K | 0.02 | 0.10 | 0.0008 | 0.004 |
| L | 6.7 | 7.3 | 0.264 | 0.287 |
| M | NOM 2.3 | | NOM 0.0905 | |


Zetex plc.
Fields New Road, Chadderton, Oldham, OL9-8NP, United Kingdom.
Telephone: (44)161 622 4422 (Sales), (44)161 622 4444 (General Enquiries)
Fax: (44)161 622 4420

Zetex GmbH
Streitfeldstraße 19
D-81673 München
Germany
Telefon: (49) 89 45 49 49 0
Fax: (49) 89 45 49 49 49

Zetex Inc.
Suite 315
700 Veterans Memorial Highway
USA
Telephone: (631) 360-2222
Fax: (631) 360-8222

Zetex (Asia) Ltd.
3701-04 Metroplaza, Tower 1
Hing Fong Road,
Kwai Fong, Hong Kong
Telephone:(852) 26100 611
Fax: (852) 24250 494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