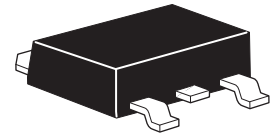


ZXMN4A06K

40V N-channel enhancement mode MOSFET

Summary

$V_{(BR)DSS} = -40V$; $R_{DS(ON)} = 0.05\Omega$; $I_D = 10.9A$

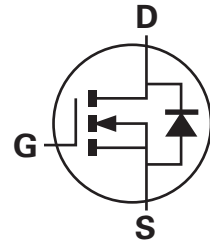


Description

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
- DPAK package



Applications

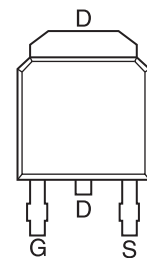
- DC - DC converters
- Audio output stages
- Relay and solenoid driving
- Motor control

Ordering information

| Device | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|--------------------|-----------------|-------------------|
| ZXMN4A06KTC | 13 | 16 | 2,500 |

Device marking

ZXMN
4A06



Pinout - Top view

ZXMN4A06K

Absolute maximum ratings

| Parameter | Symbol | Limit | Unit |
|---|-------------------|--------------------|---------------------|
| Drain-source voltage | V_{DSS} | 40 | V |
| Gate-source voltage | V_{GS} | ± 20 | V |
| Continuous drain current: $V_{GS}=10V$; $T_A=25^\circ C$ ^(b) $V_{GS}=10V$; $T_A=70^\circ C$ ^(b) $V_{GS}=10V$; $T_A=25^\circ C$ ^(a) | I_D | 10.9 8.7 7.2 | A A A |
| Pulsed drain current ^(c) | I_{DM} | 35.3 | A |
| Continuous source current (body diode) ^(b) | I_S | 10.8 | A |
| Pulsed source current (body diode) ^(c) | I_{SM} | 35.3 | A |
| Power dissipation at $T_A=25^\circ C$ ^(a) Linear derating factor | P_D | 4.2 33.6 | W mW/ $^\circ C$ |
| Power dissipation at $T_A=25^\circ C$ ^(b) Linear derating factor | P_D | 9.5 76 | W mW/ $^\circ C$ |
| Power dissipation at $T_A=25^\circ C$ ^(d) Linear derating factor | P_D | 2.15 17.2 | W mW/ $^\circ C$ |
| Operating and storage temperature range | T_j : T_{stg} | -55 to +150 | $^\circ C$ |

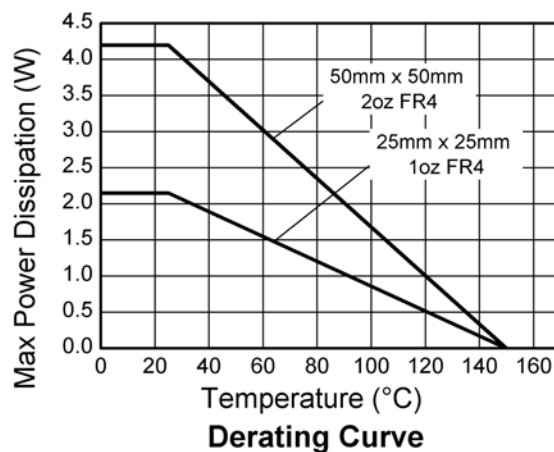
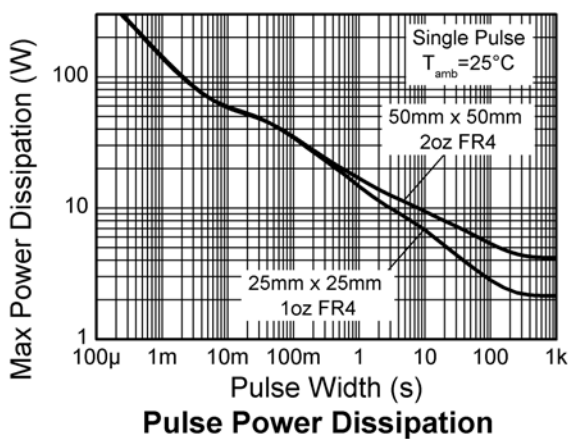
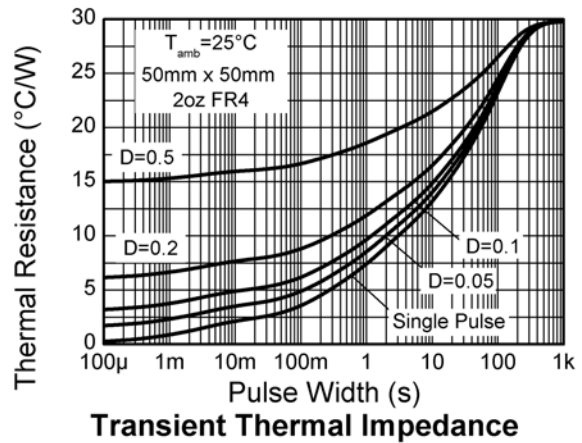
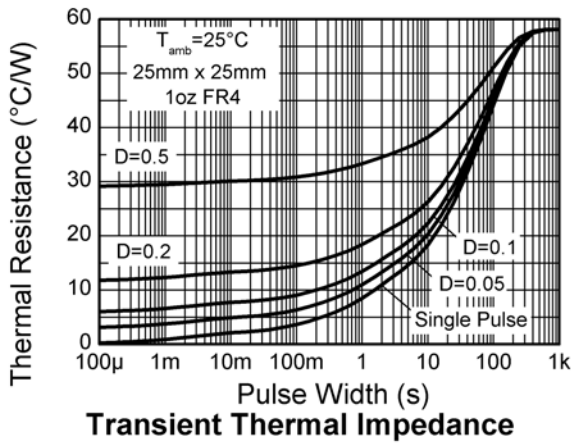
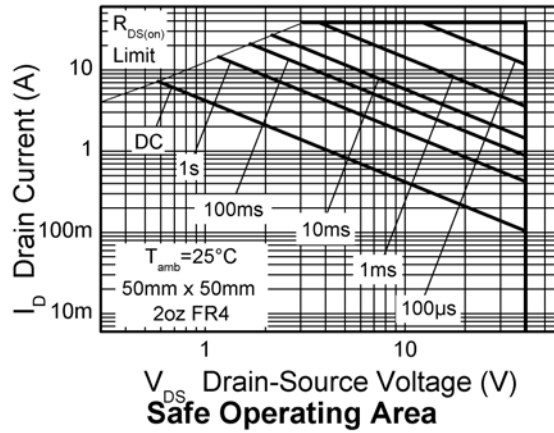
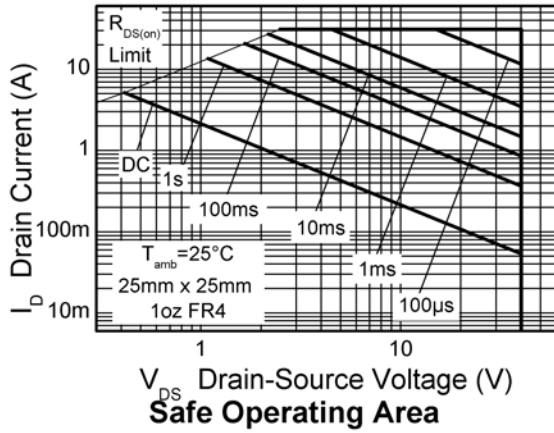
Thermal resistance

| Parameter | Symbol | Value | Unit |
|------------------------------------|-----------------|-------|--------------|
| Junction to ambient ^(a) | $R_{\theta JA}$ | 30 | $^\circ C/W$ |
| Junction to ambient ^(b) | $R_{\theta JA}$ | 13.2 | $^\circ C/W$ |
| Junction to ambient ^(d) | $R_{\theta JA}$ | 58 | $^\circ C/W$ |

NOTES:

- (a) 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.
- (b) For a device surface mounted on FR4 PCB measured at $t = 10$ sec.
- (c) Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB, $D=0.02$ pulse width=300 s - pulse width limited by maximum junction temperature.
- (d) 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.

Characteristics



ZXMN4A06K

Electrical characteristics (at $T_A = 25^\circ\text{C}$ unless otherwise stated)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|--|---------------|------|------|-------|---------------|---|
| Static | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | 40 | | | V | $I_D=250\mu\text{A}, V_{GS}=0\text{V}$ |
| Zero gate voltage drain current | I_{DSS} | | | 1 | μA | $V_{DS}=40\text{V}, V_{GS}=0\text{V}$ |
| Gate-body leakage | I_{GSS} | | | 100 | nA | $V_{GS}=\pm 20\text{V}, V_{DS}=0\text{V}$ |
| Gate-source threshold voltage | $V_{GS(th)}$ | 1.0 | | | V | $I_D=250\mu\text{A}, V_{DS}=V_{GS}$ |
| Static drain-source on-state resistance ^(*) | $R_{DS(on)}$ | | | 0.050 | Ω | $V_{GS}=10\text{V}, I_D=4.5\text{A}$ |
| | | | | 0.075 | Ω | $V_{GS}=4.5\text{V}, I_D=3.2\text{A}$ |
| Forward transconductance ^(‡) | g_{fs} | | 11.5 | | S | $V_{DS}=15\text{V}, I_D=4.5\text{A}$ |
| Dynamic^(‡) | | | | | | |
| Input capacitance | C_{iss} | | 827 | | pF | $V_{DS}=20\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$ |
| Output capacitance | C_{oss} | | 133 | | pF | |
| Reverse transfer capacitance | C_{rss} | | 84 | | pF | |
| Switching^(†) (‡) | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | | 3.2 | | ns | $V_{DD}=20\text{V}, I_D=1\text{A}$ $R_G=6.0\Omega, V_{GS}=10\text{V}$ (refer to test circuit) |
| Rise time | t_r | | 3.8 | | ns | |
| Turn-off delay time | $t_{d(off)}$ | | 23.3 | | ns | |
| Fall time | t_f | | 10.9 | | ns | |
| Total gate charge | Q_g | | 17.1 | | nC | $V_{DS}=20\text{V}, V_{GS}=10\text{V}, I_D=4.5\text{A}$ (refer to test circuit) |
| Gate-source charge | Q_{gs} | | 2.41 | | nC | |
| Gate-drain charge | Q_{gd} | | 3.4 | | nC | |
| Source-drain diode | | | | | | |
| Diode forward voltage ^(*) | V_{SD} | | 0.83 | 0.95 | V | $T_J=25^\circ\text{C}, I_S=4.5\text{A}, V_{GS}=0\text{V}$ |
| Reverse recovery time ^(†) | t_{rr} | | 16 | | ns | $T_J=25^\circ\text{C}, I_F=4\text{A}, di/dt=100\text{A}/\mu\text{s}$ |
| Reverse recovery charge ^(‡) | Q_{rr} | | 9 | | nC | |

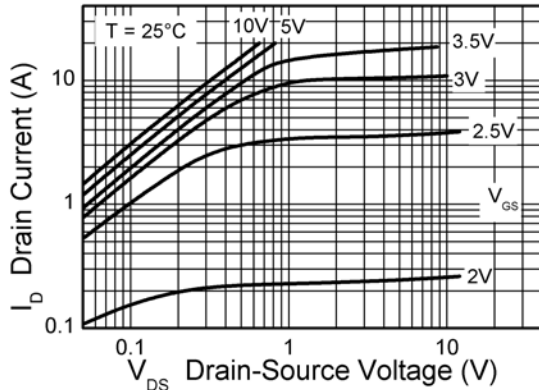
NOTES:

(*) Measured under pulsed conditions. Width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

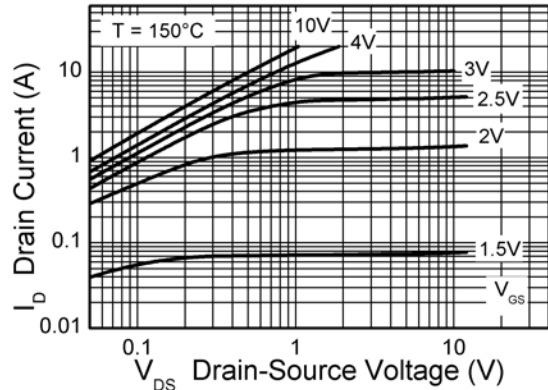
(†) Switching characteristics are independent of operating junction temperature.

(‡) For design aid only, not subject to production testing.

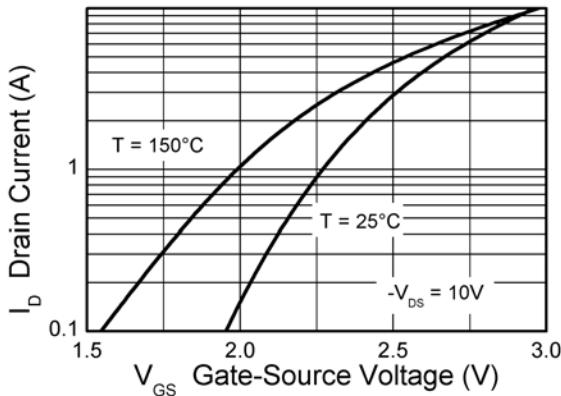
Typical characteristics



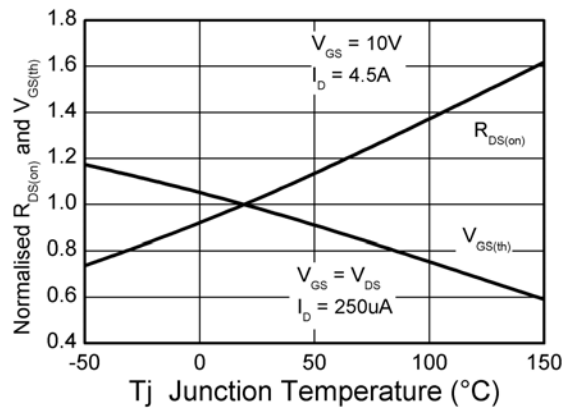
Output Characteristics



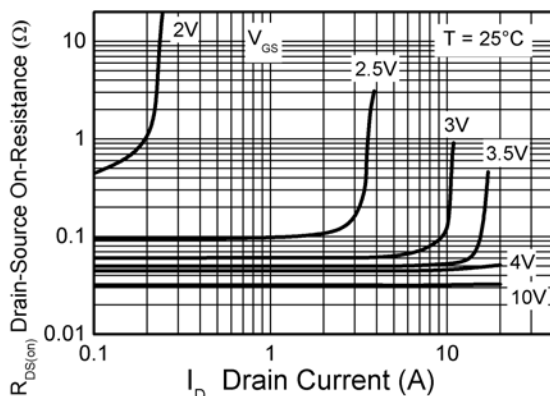
Output Characteristics



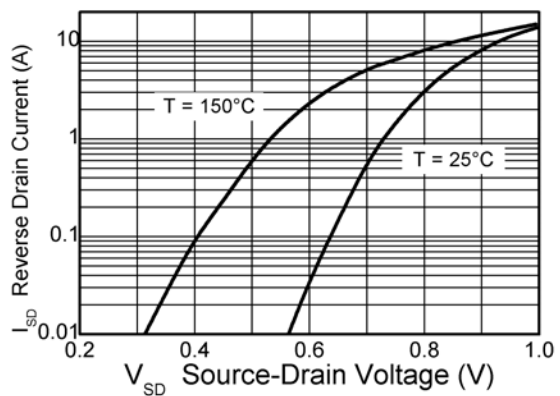
Typical Transfer Characteristics



Normalised Curves v Temperature

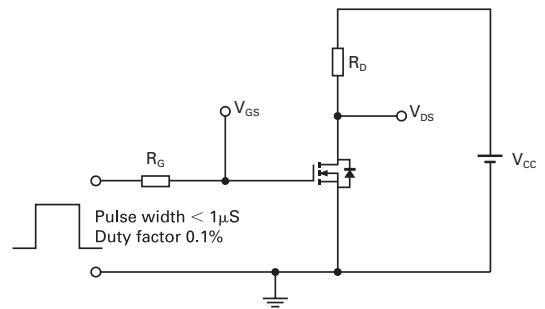
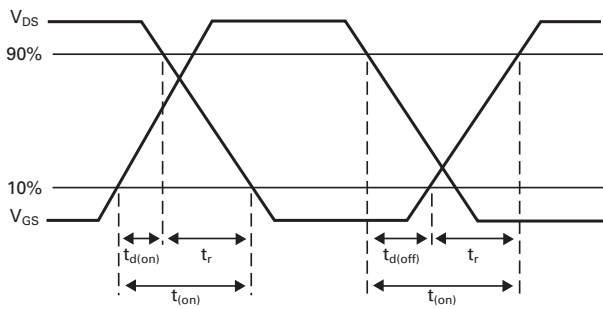
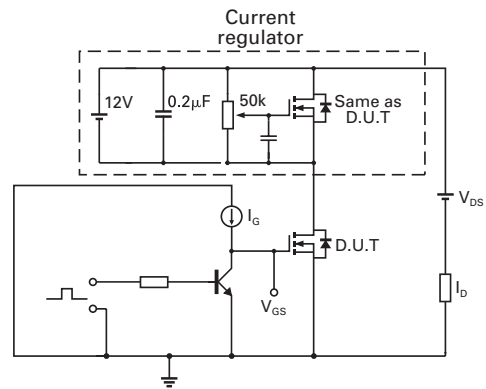
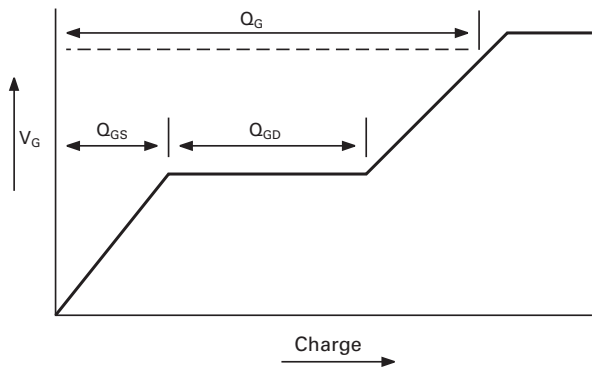
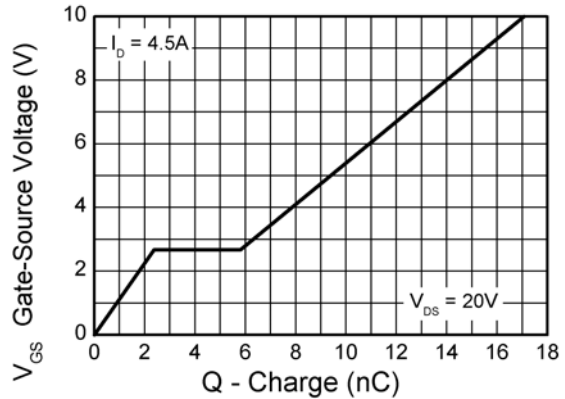
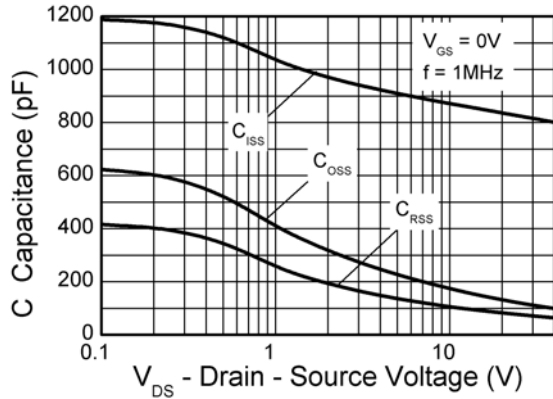


On-Resistance v Drain Current



Source-Drain Diode Forward Voltage

Typical characteristics

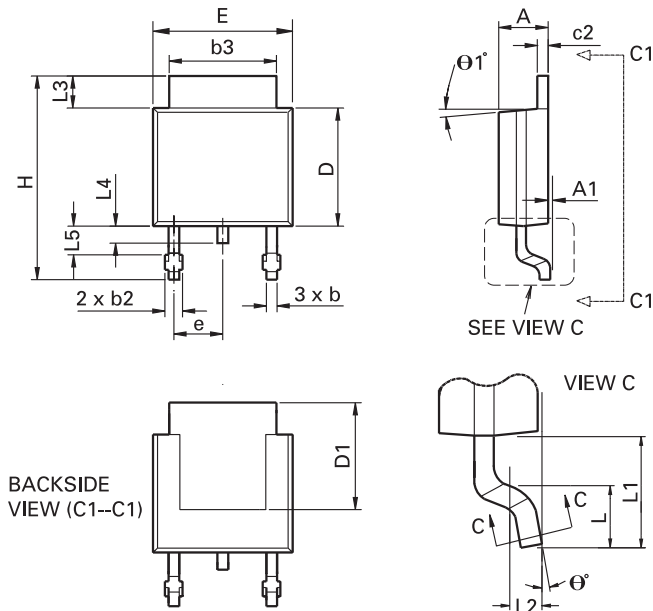


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ZXMN4A06K

Package details - DPAK



Package 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° | 0° | 10° | 0° | 10° |
| E | 0.250 | 0.265 | 6.35 | 6.73 | theta 0° | 0° | 15° | 0° | 15° |
| E1 | 0.170 | - | 4.32 | - | - | - | - | - | - |

Note: Controlling dimensions are in inches. Approximate dimensions are provided in millimeters

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