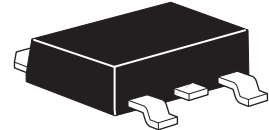


ZXMP4A16K

40V P-channel enhancement mode MOSFET

Summary

$V_{(BR)DSS} = -40V$; $R_{DS(ON)} = 0.060\Omega$ $I_D = -9.9A$

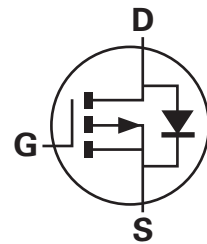


Description

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

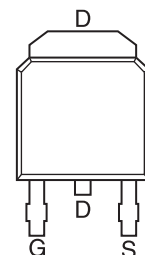


Applications

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

Ordering information

| Device | Reel size (inches) | Tape width | Quantity per reel |
|-------------|--------------------|------------|-------------------|
| ZXMP4A16KTC | 13 | 16mm | 2500 units |



Pinout - Top view

Device marking

ZXMP
4A16

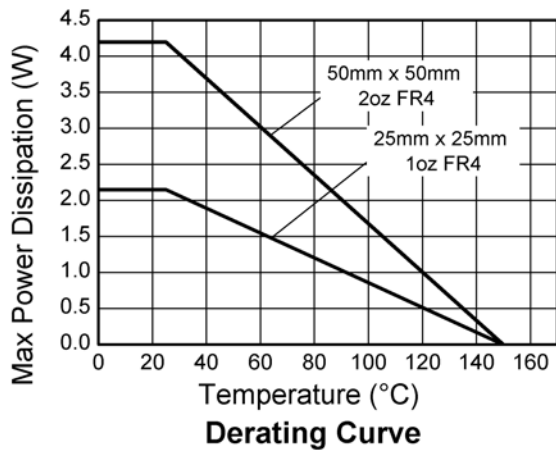
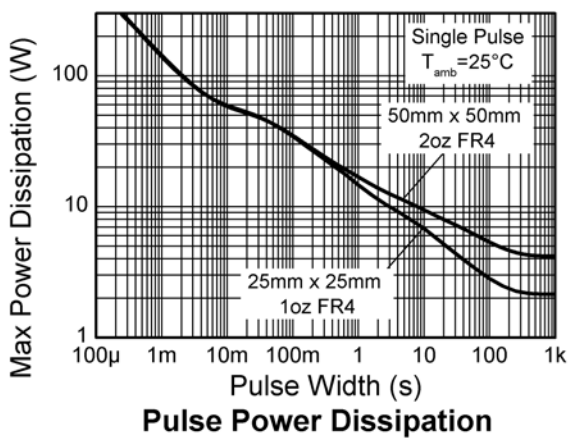
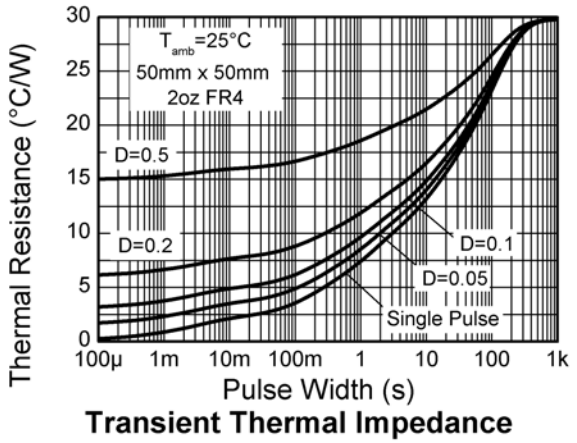
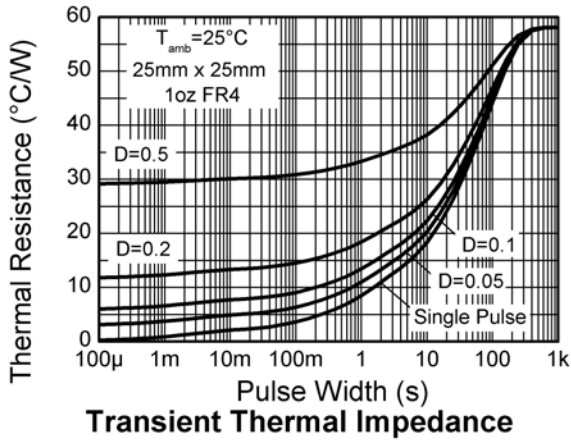
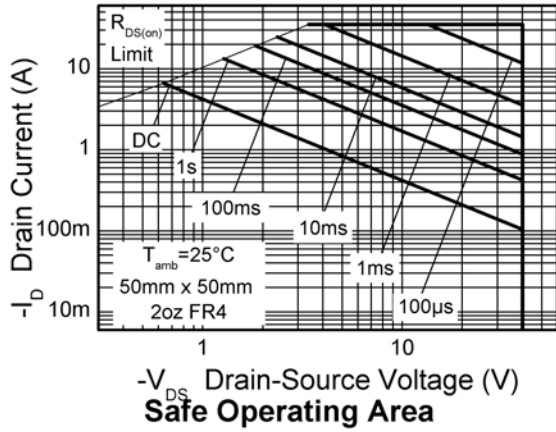
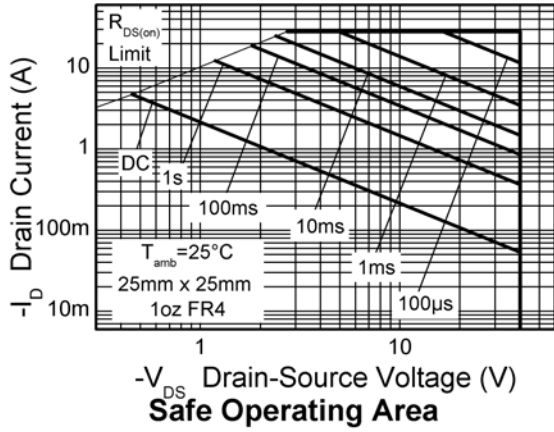
Absolute maximum rating

| 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 | -9.9 -8.0 -6.6 | A A A |
| Pulsed drain current ^(c) | I_{DM} | -35 | A |
| Continuous source current (body diode) ^(b) | I_S | -10.1 | A |
| Pulsed source current (body diode) ^(c) | I_{SM} | -35 | A |
| Power dissipation at $T_A = 25^\circ C$ ^(a) Linear derating factor | P_D | 4.2 33.6 | W mW/°C |
| Power dissipation at $T_A = 25^\circ C$ ^(b) Linear derating factor | P_D | 9.5 76 | W mW/°C |
| Power dissipation at $T_A = 25^\circ C$ ^(d) Linear derating factor | P_D | 2.15 17.2 | W 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) | $R_{\theta JA}$ | 30 | °C/W |
| Junction to ambient ^(b) | $R_{\theta JA}$ | 13.2 | °C/W |
| Junction to ambient ^(d) | $R_{\theta JA}$ | 58 | °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 $t \leq 10$ sec.
- (c) Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB, $D=0.02$ pulse width=300 μ 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



ZXMP4A16K

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 (*) | $R_{DS(on)}$ | | | 0.060 | Ω | $V_{GS} = -10\text{V}$, $I_D = -3.8\text{A}$ |
| | | | | 0.100 | Ω | $V_{GS} = -4.5\text{V}$, $I_D = -2.9\text{A}$ |
| Forward transconductance (*) (‡) | g_{fs} | | 7.4 | | S | $V_{DS} = -15\text{V}$, $I_D = -3.8\text{A}$ |
| Dynamic (‡) | | | | | | |
| Input capacitance | C_{iss} | | 965 | | pF | $V_{DS} = -20\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$ |
| Output capacitance | C_{oss} | | 180 | | pF | |
| Reverse transfer capacitance | C_{rss} | | 158 | | pF | |
| Switching (†) (‡) | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | | 4.0 | | ns | $V_{DD} = -20\text{V}$, $I_D = -1\text{A}$ $R_G = 6.0\Omega$, $V_{GS} = -10\text{V}$ |
| Rise time | t_r | | 6.0 | | ns | |
| Turn-off delay time | $t_{d(off)}$ | | 36.8 | | ns | |
| Fall time | t_f | | 17.1 | | ns | |
| Gate charge | Q_g | | 16.5 | | nC | $V_{DS} = -20\text{V}$, $V_{GS} = -5\text{V}$, $I_D = -3.8\text{A}$ |
| Total gate charge | Q_g | | 29.6 | | nC | $V_{DS} = -20\text{V}$, $V_{GS} = -10\text{V}$, $I_D = -3.8\text{A}$ |
| Gate-source charge | Q_{gs} | | 2.8 | | nC | |
| Gate-drain charge | Q_{gd} | | 8.1 | | nC | |
| Source-drain diode | | | | | | |
| Diode forward voltage (*) | V_{SD} | | -0.89 | -1.2 | V | $T_J = 25^\circ\text{C}$, $I_S = -3.8\text{A}$, $V_{GS} = 0\text{V}$ |
| Reverse recovery time (‡) | t_{rr} | | 29.8 | | ns | $T_J = 25^\circ\text{C}$, $I_F = -3.8\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$ |
| Reverse recovery charge (‡) | Q_{rr} | | 37.2 | | nC | |

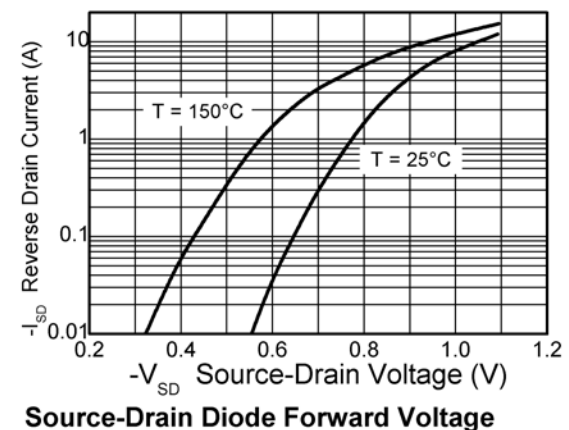
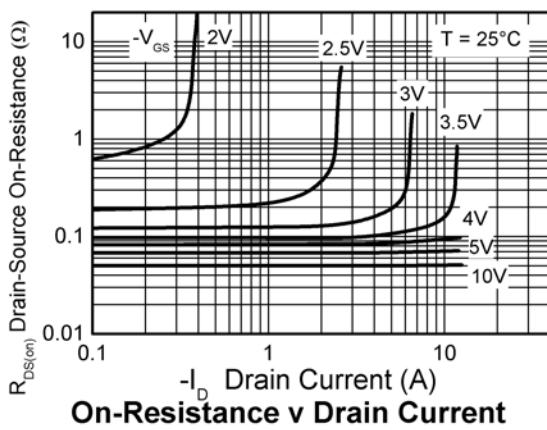
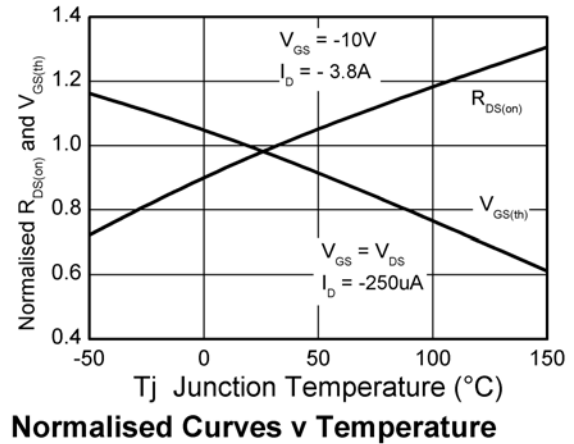
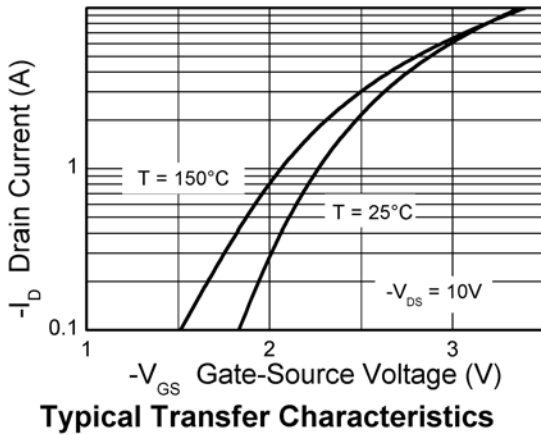
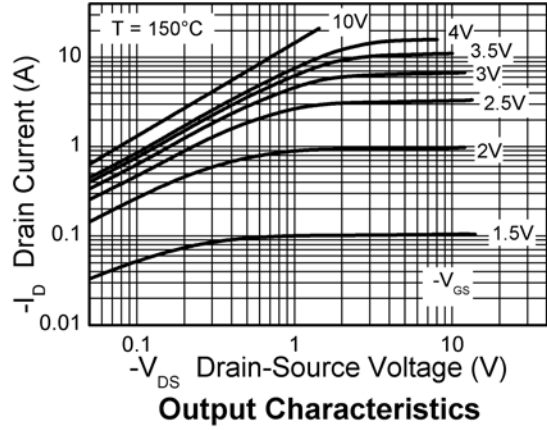
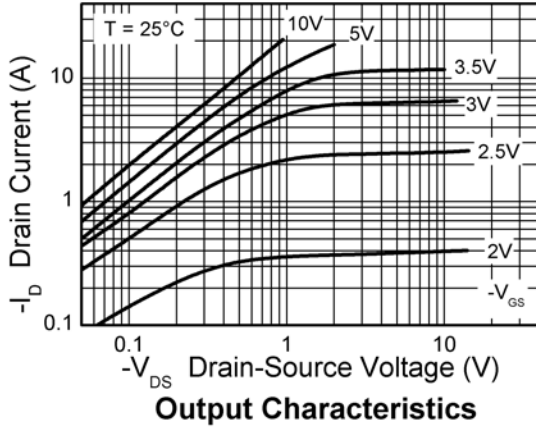
NOTES:

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

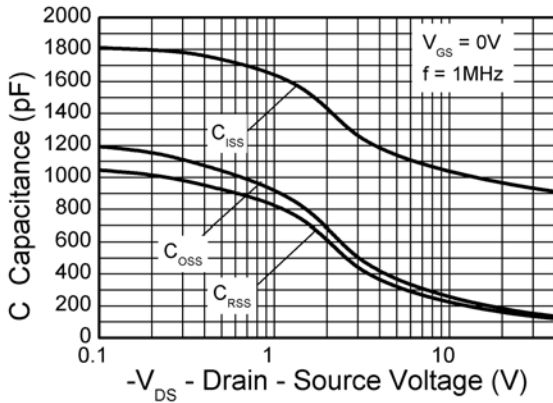
(†) Switching characteristics are independent of operating junction temperature.

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

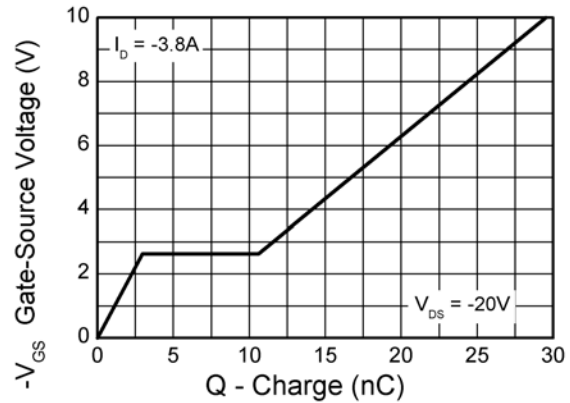
Typical characteristics



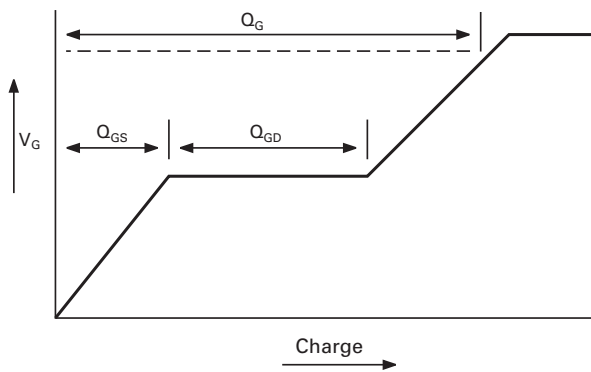
Typical characteristics



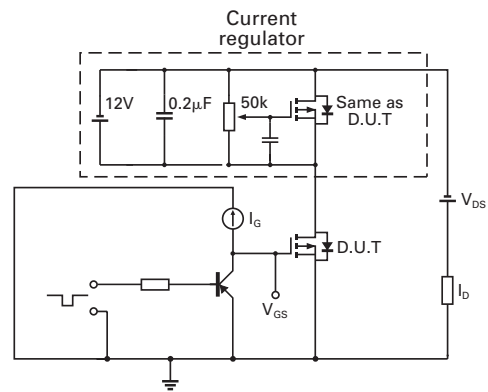
Capacitance v Drain-Source Voltage



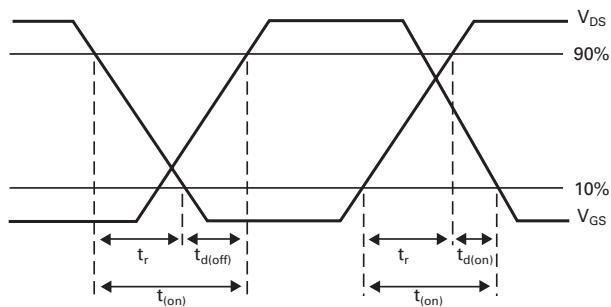
Gate-Source Voltage v Gate Charge



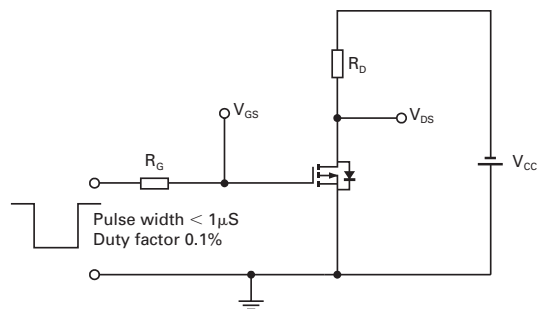
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms



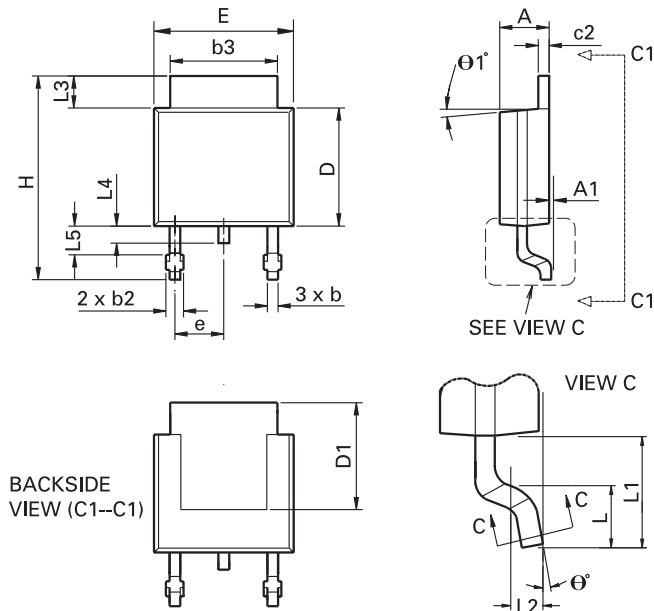
Switching time test circuit

ZXMP4A16K

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ZXMP4A16K

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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