

ZXMP6A16DN8

DUAL P-CHANNEL 60V ENHANCEMENT MODE MOSFET

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON) Max}$ | Package | I_D $T_A = +25^\circ C$ (Notes 4 & 6) |
|---------------|--------------------------|---------|---|
| -60V | 85mΩ @ $V_{GS} = -10V$ | SO-8 | -3.9A |
| | 125mΩ @ $V_{GS} = -4.5V$ | | -3.2A |

Description

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.

Applications

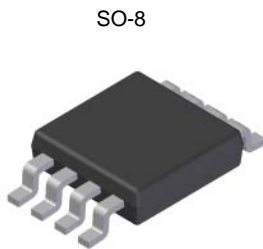
- DC-DC Converters
- Power Management Functions
- Disconnect Switches
- Motor Control

Features

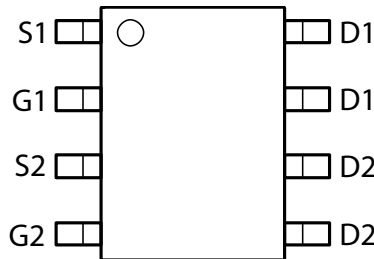
- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive
- Low Profile SOIC Package
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

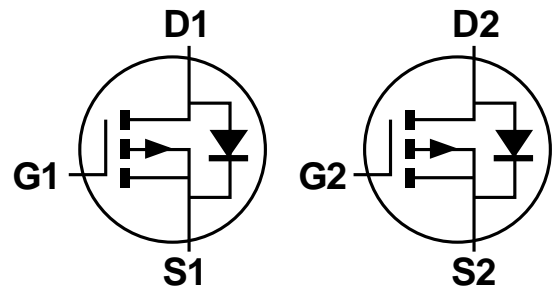
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish; Solderable per MIL-STD-202, Method 208
- Weight: 0.074 grams (approximate)



Top View



Top View



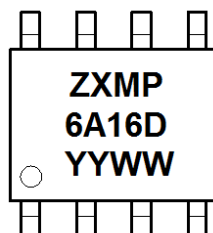
Equivalent Circuit

Ordering Information

| Part Number | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|-----------|--------------------|-----------------|-------------------|
| ZXMP6A16DN8TA | ZXMP6A16D | 7 | 12 | 500 |

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 2. See <http://www.diodes.com> 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.

Marking Information



ZXMP6A16D = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 11 = 2011)
WW = Week (01 - 53)

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

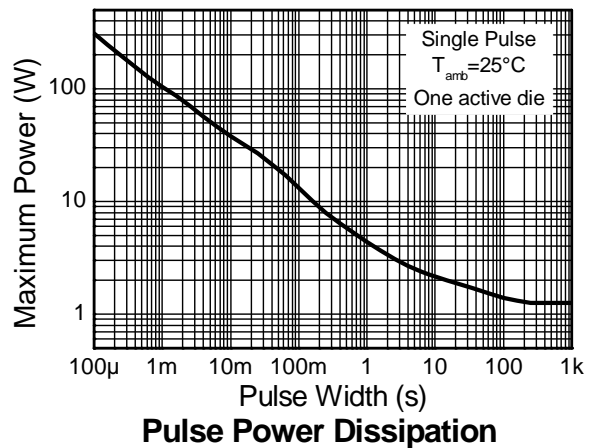
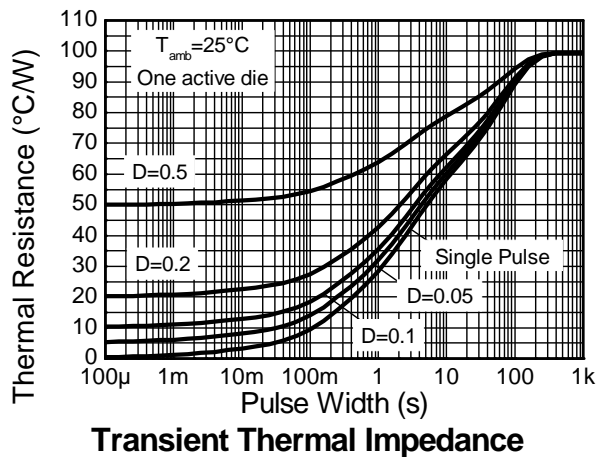
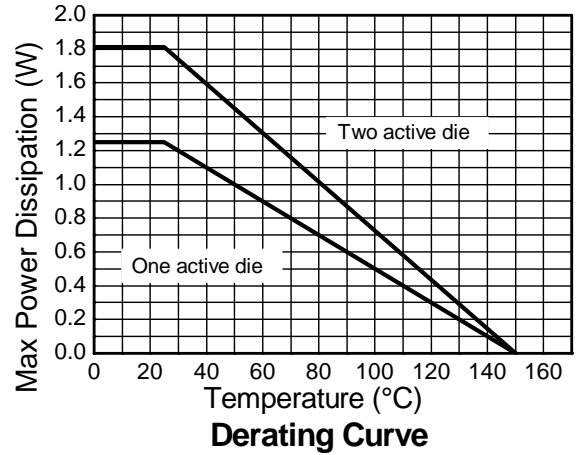
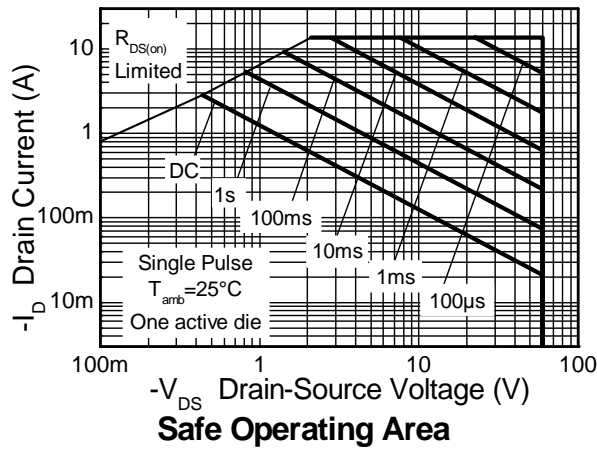
| Characteristic | | Symbol | Value | Unit | |
|--|-----------------------|-----------|---|------|---|
| Drain-Source voltage | | V_{DSS} | -60 | V | |
| Gate-Source voltage | | V_{GS} | ± 20 | V | |
| Continuous Drain current | $V_{GS} = 10\text{V}$ | I_D | (Notes 6 & 8) | -3.9 | A |
| | | | $T_A = +70^\circ\text{C}$ (Notes 6 & 8) | -3.1 | |
| | | | (Notes 5 & 8) | -2.9 | |
| Pulsed Drain current | | I_{DM} | -18.3 | A | |
| Continuous Source current (Body diode) | | I_S | -3.2 | A | |
| Pulsed Source current (Body diode) | | I_{SM} | -18.3 | A | |

Thermal Characteristics

| Characteristic | | Symbol | Value | Unit |
|---|----------------|-----------------|------------------|---------------------------|
| Power dissipation Linear derating factor | (Notes 5 & 8) | P_D | 1.25 | W mW/ $^\circ\text{C}$ |
| | | | 10.0 | |
| | (Notes 5 & 9) | | 1.81 | |
| | (Notes 6 & 8) | | 14.5 | |
| Thermal Resistance, Junction to Ambient | (Notes 5 & 8) | $R_{\theta JA}$ | 2.15 | $^\circ\text{C/W}$ |
| | (Notes 5 & 9) | | 17 | |
| | (Notes 6 & 8) | | 100 | |
| Thermal Resistance, Junction to Lead | (Notes 8 & 10) | $R_{\theta JL}$ | 70 | $^\circ\text{C/W}$ |
| Operating and storage temperature range | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ | |

- Notes:
4. AEC-Q101 V_{GS} maximum is $\pm 16\text{V}$.
 5. 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.
 6. Same as note (5), except the device is measured at $t \leq 10$ sec.
 7. Same as note (5), except the device is pulsed with $D = 0.02$ and pulse width 300 μs .
 8. For a dual device with one active die.
 9. For a device with two active die running at equal power.
 10. Thermal resistance from junction to solder-point.

Thermal Characteristics



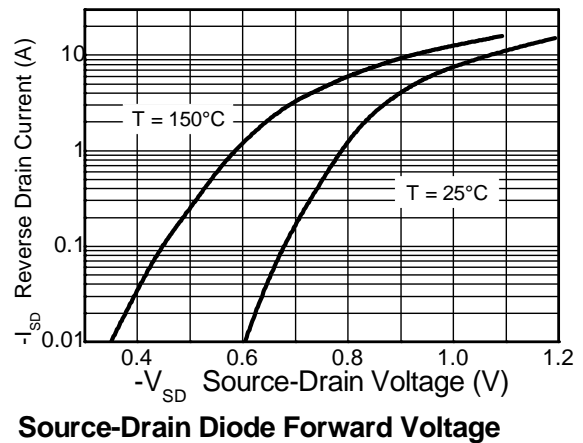
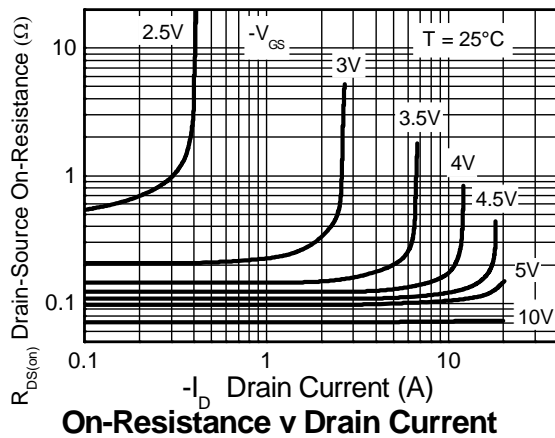
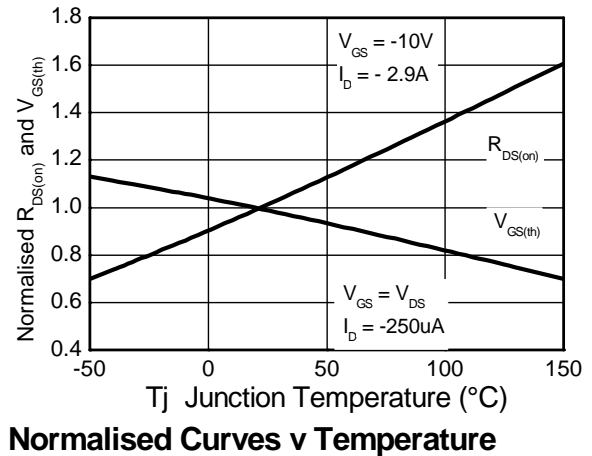
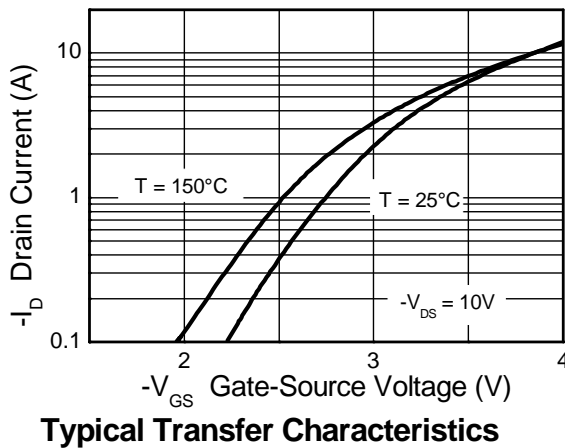
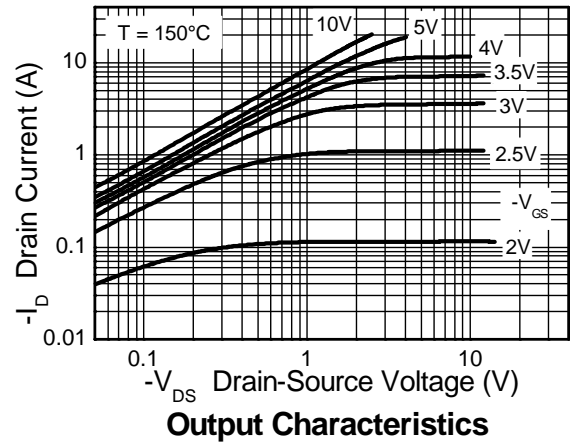
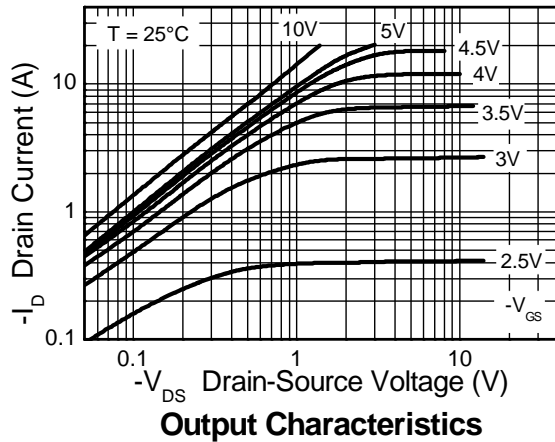
ZXMP6A16DN8

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

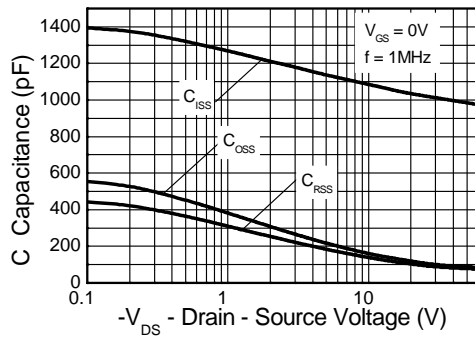
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition | |
|---|---------------------|------|-------|-------|------|--|---|
| OFF CHARACTERISTICS | | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -60 | — | — | V | I _D = -250μA, V _{GS} = 0V | |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | -1.0 | μA | V _{DS} = -60V, V _{GS} = 0V | |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V | |
| ON CHARACTERISTICS | | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | -1.0 | — | — | V | I _D = -250μA, V _{DS} = V _{GS} | |
| Static Drain-Source On-Resistance (Note 11) | R _{DS(on)} | — | — | 85 | mΩ | V _{GS} = -10V, I _D = -2.9A | |
| | | | — | 125 | | V _{GS} = -4.5V, I _D = -2.4A | |
| Forward Transconductance (Notes 11 & 12) | g _{fs} | — | 7.2 | — | S | V _{DS} = -15V, I _D = -2.9A | |
| Diode Forward Voltage (Note 11) | V _{SD} | — | -0.85 | -0.95 | V | I _S = -3.4A, V _{GS} = 0V, T _J = +25°C | |
| Reverse recovery time (Note 12) | t _{rr} | — | 29.2 | — | ns | I _S = -2A, di/dt = 100A/μs, | |
| Reverse recovery charge (Note 12) | Q _{rr} | — | 39.6 | — | nC | T _J = +25°C | |
| DYNAMIC CHARACTERISTICS (Note 12) | | | | | | | |
| Input Capacitance | C _{iss} | — | 1021 | — | pF | V _{DS} = -30V, V _{GS} = 0V, f = 1MHz | |
| Output Capacitance | C _{oss} | — | 83.1 | — | pF | | |
| Reverse Transfer Capacitance | C _{rss} | — | 56.4 | — | pF | | |
| Total Gate Charge (Note 13) | Q _g | — | 12.1 | — | nC | V _{GS} = -5V | V _{DS} = -30V, I _D = -2.9A |
| Total Gate Charge (Note 13) | Q _g | — | 24.2 | — | nC | V _{GS} = -10V | |
| Gate-Source Charge (Note 13) | Q _{gs} | — | 2.5 | — | nC | | |
| Gate-Drain Charge (Note 13) | Q _{gd} | — | 3.7 | — | nC | | |
| Turn-On Delay Time (Note 13) | t _{D(on)} | — | 3.5 | — | ns | V _{DD} = -30V, V _{GS} = -10V, I _D = -1A, R _G ≅ 6.0Ω | |
| Turn-On Rise Time (Note 13) | t _r | — | 4.1 | — | ns | | |
| Turn-Off Delay Time (Note 13) | t _{D(off)} | — | 35 | — | ns | | |
| Turn-Off Fall Time (Note 13) | t _f | — | 10 | — | ns | | |

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

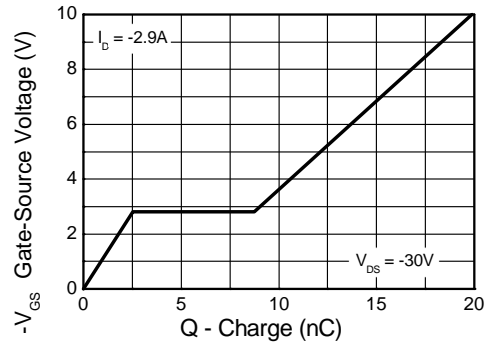
Typical Characteristics



Typical Characteristics (cont.)

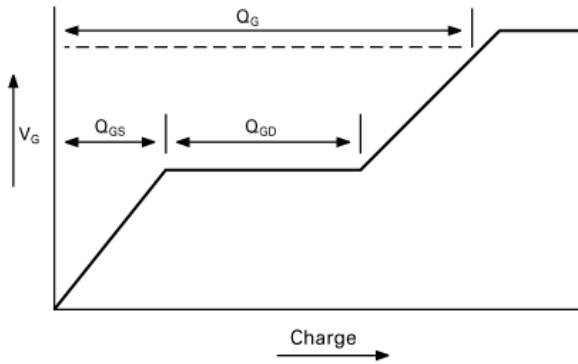


Capacitance v Drain-Source Voltage

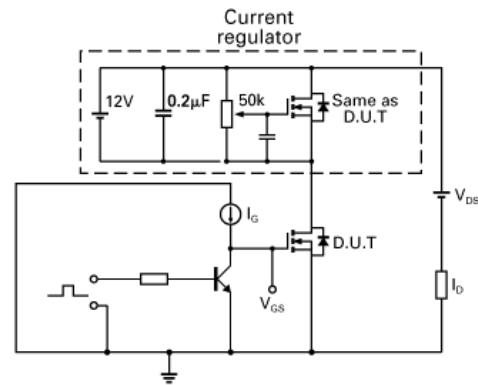


Gate-Source Voltage v Gate Charge

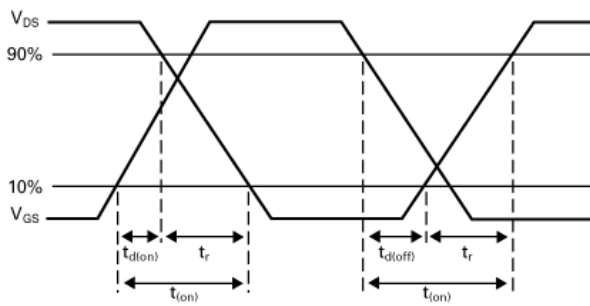
Test Circuits



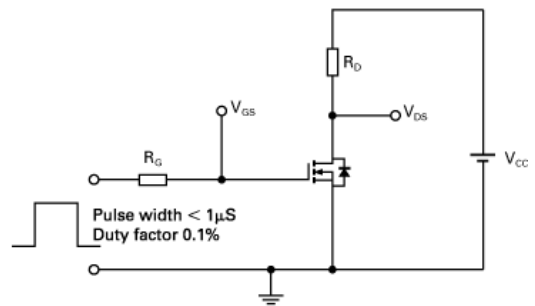
Basic gate charge waveform



Gate charge test circuit



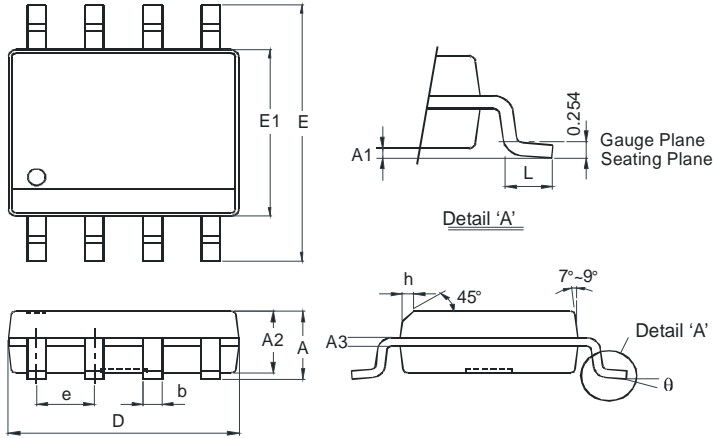
Switching time waveforms



Switching time test circuit

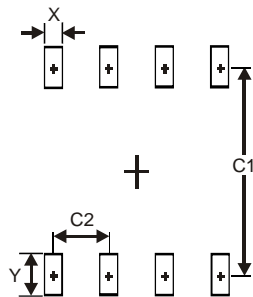
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Package Outline Dimensions



| SO-8 | | |
|----------------------|----------|------|
| Dim | Min | Max |
| A | - | 1.75 |
| A1 | 0.10 | 0.20 |
| A2 | 1.30 | 1.50 |
| A3 | 0.15 | 0.25 |
| b | 0.3 | 0.5 |
| D | 4.85 | 4.95 |
| E | 5.90 | 6.10 |
| E1 | 3.85 | 3.95 |
| e | 1.27 Typ | |
| h | - | 0.35 |
| L | 0.62 | 0.82 |
| θ | 0° | 8° |
| All Dimensions in mm | | |

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| X | 0.60 |
| Y | 1.55 |
| C1 | 5.4 |
| C2 | 1.27 |

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