

Product Summary

| BV _{DSS} | R _{DS(ON)} Max | Package | I _D T _A = +25°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

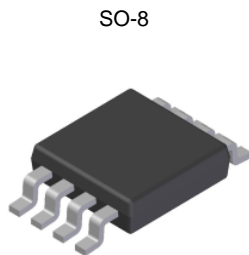
- DC-DC Converters
- Power Management Functions
- Disconnect Switches
- Motor Control

Features

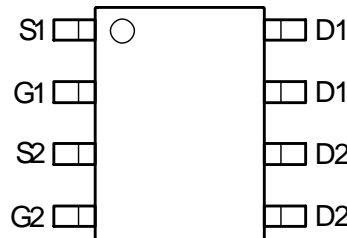
- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive
- Low Profile SOIC Package
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([ZXMP6A16DN8Q](#))**

Mechanical Data

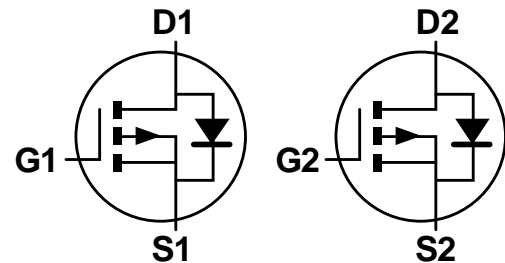
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.074 grams (Approximate)



Top View



Top View



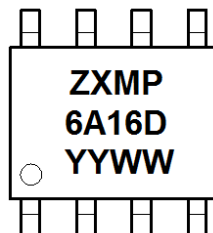
Equivalent Circuit

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|------|-------------------|
| ZXMP6A16DN8TA | SO-8 | 500/Tape & Reel |
| ZXMP6A16DN8TC | SO-8 | 2,500/Tape & Reel |

- 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/quality/lead_free.html 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.
 4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



ZXMP6A16D = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 16 = 2016)
 WW = Week (01 - 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

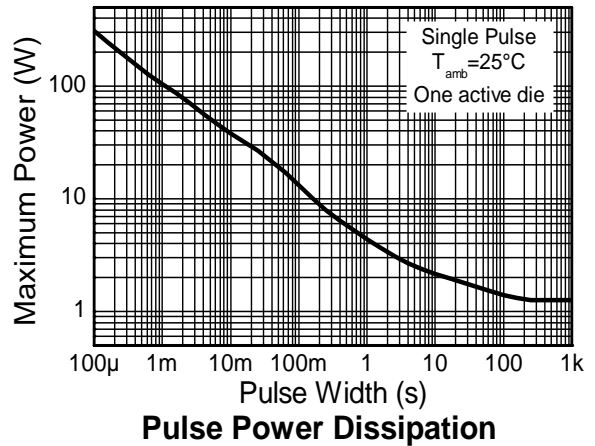
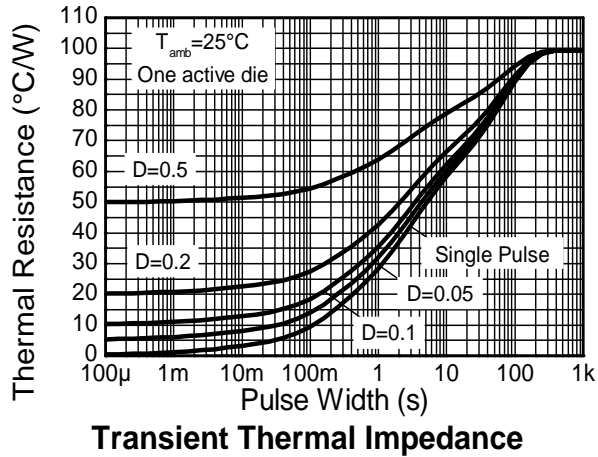
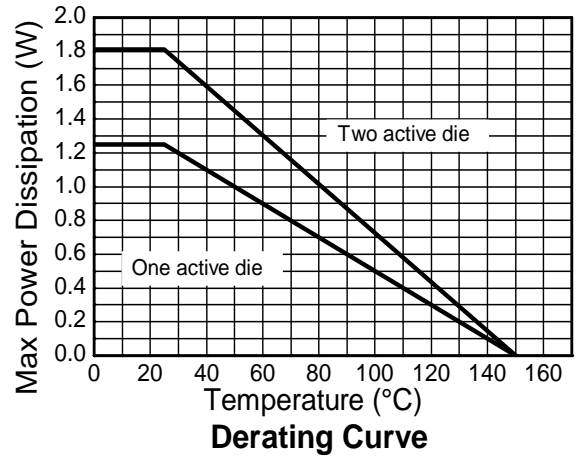
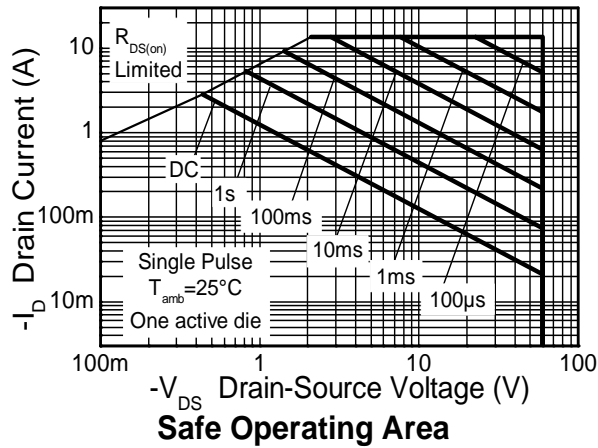
| Characteristic | | Symbol | Value | Unit |
|--|-----------------------|---|-------|------|
| Drain-Source Voltage | | V _{DSS} | -60 | V |
| Gate-Source Voltage | | V _{GS} | ±20 | V |
| Continuous Drain Current | V _{GS} = 10V | (Notes 7 & 9) | -3.9 | A |
| | | T _A = +70°C (Notes 7 & 9) | -3.1 | |
| | | (Notes 6 & 9) | -2.9 | |
| | | I _D | | |
| 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 6 & 9) | P _D | 1.25 | W mW/°C |
| | | | 10.0 | |
| | (Notes 6 & 10) | | 1.81 | |
| | | | 14.5 | |
| Thermal Resistance, Junction to Ambient | (Notes 7 & 9) | R _{θJA} | 2.15 | °C/W |
| | (Notes 6 & 9) | | 17 | |
| | (Notes 6 & 10) | | 100 | |
| Thermal Resistance, Junction to Lead | (Notes 7 & 9) | R _{θJL} | 70 | °C/W |
| | (Notes 9 & 11) | | 60 | |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +150 | °C |

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

Thermal Characteristics (Continued)

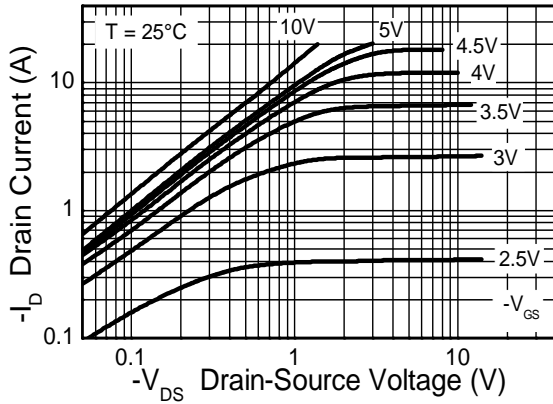


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

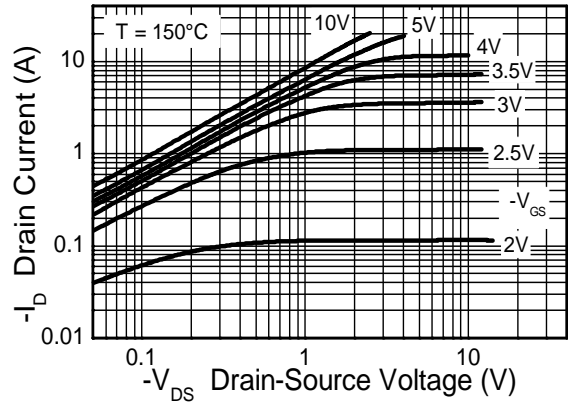
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition | |
|---|---------------------|------|-------|-------|------|--|---|
| OFF CHARACTERISTICS | | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -60 | — | — | V | I _D = -250μA, V _{GS} = 0V | |
| Zero Gate Voltage Drain Current | 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 12) | R _{DS(ON)} | — | — | 85 | mΩ | V _{GS} = -10V, I _D = -2.9A | |
| | | | — | 125 | | V _{GS} = -4.5V, I _D = -2.4A | |
| Forward Transconductance (Notes 12 & 13) | g _{FS} | — | 7.2 | — | S | V _{DS} = -15V, I _D = -2.9A | |
| Diode Forward Voltage (Note 12) | V _{SD} | — | -0.85 | -0.95 | V | I _S = -3.4A, V _{GS} = 0V, T _J = +25°C | |
| Reverse Recovery Time (Note 13) | t _{RR} | — | 29.2 | — | ns | I _S = -2A, di/dt = 100A/μs, | |
| Reverse Recovery Charge (Note 13) | Q _{RR} | — | 39.6 | — | nC | T _J = +25°C | |
| DYNAMIC CHARACTERISTICS (Note 14) | | | | | | | |
| Input Capacitance | C _{ISS} | — | 1,021 | — | 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 | Q _G | — | 12.1 | — | nC | V _{GS} = -5V | V _{DS} = -30V, I _D = -2.9A |
| Total Gate Charge | Q _G | — | 24.2 | — | nC | V _{GS} = -10V | |
| Gate-Source Charge | Q _{GS} | — | 2.5 | — | nC | | |
| Gate-Drain Charge | Q _{GD} | — | 3.7 | — | nC | | |
| Turn-On Delay Time | t _{D(ON)} | — | 3.5 | — | ns | V _{DD} = -30V, V _{GS} = -10V, I _D = -1A, R _G ≅ 6.0Ω | |
| Turn-On Rise Time | t _R | — | 4.1 | — | ns | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 35 | — | ns | | |
| Turn-Off Fall Time | t _F | — | 10 | — | ns | | |

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

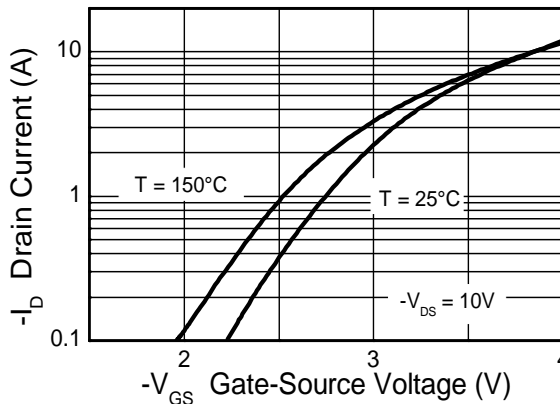
Typical Characteristics



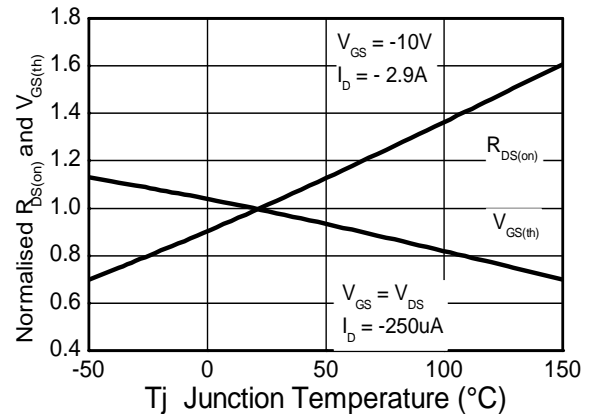
Output Characteristics



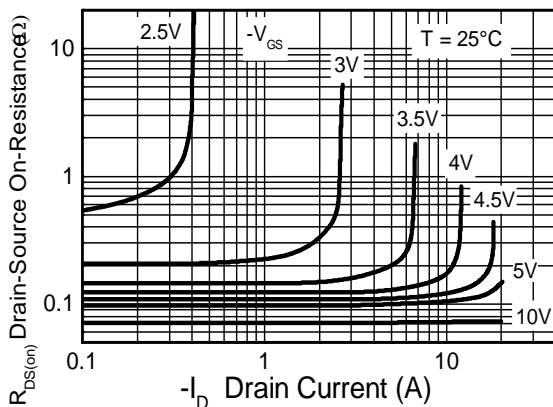
Output Characteristics



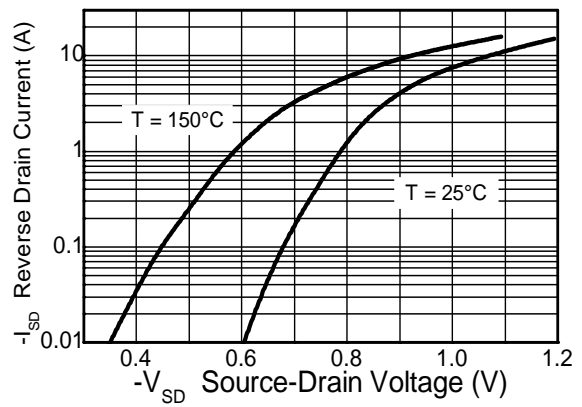
Typical Transfer Characteristics



Normalised Curves v Temperature

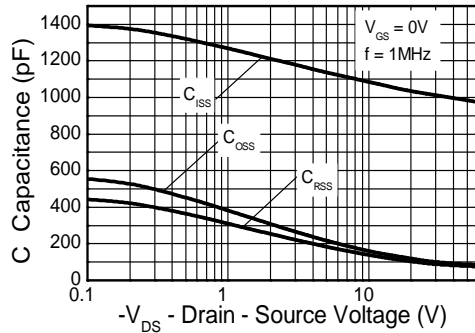


On-Resistance v Drain Current

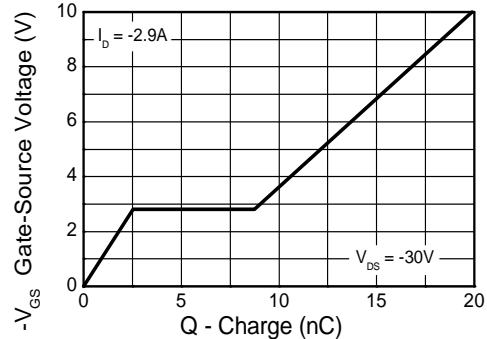


Source-Drain Diode Forward Voltage

Typical Characteristics (Continued)

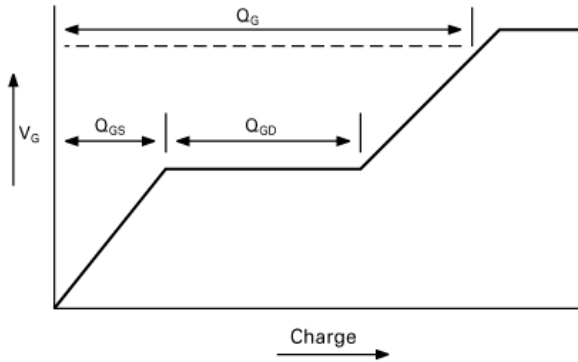


Capacitance v Drain-Source Voltage

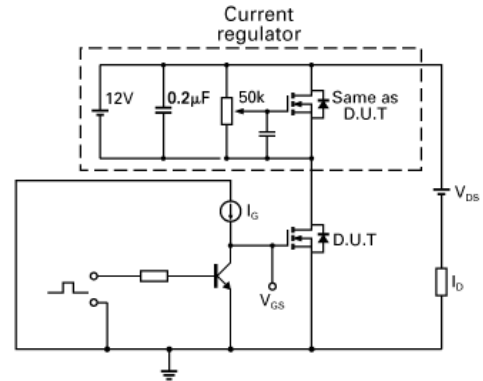


Gate-Source Voltage v Gate Charge

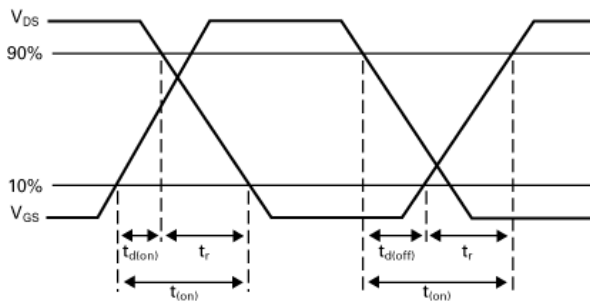
Test Circuits



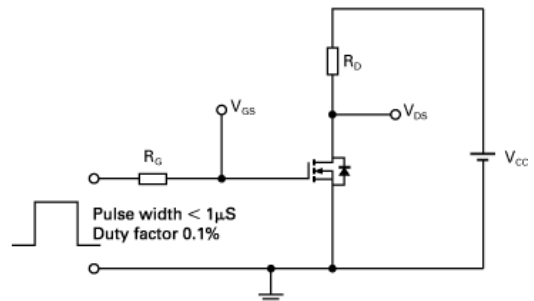
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms

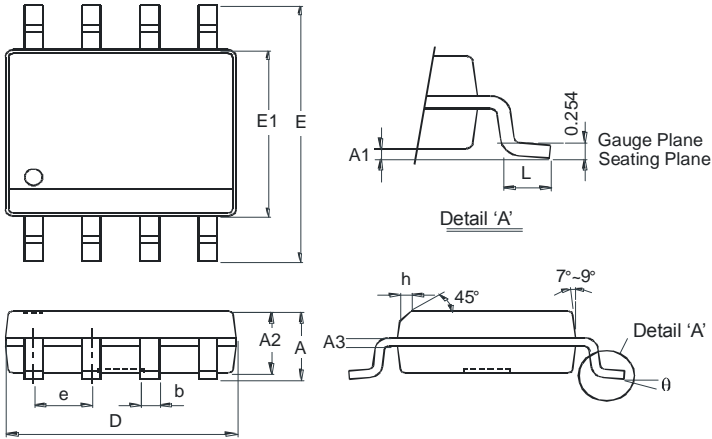


Switching time test circuit

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SO-8

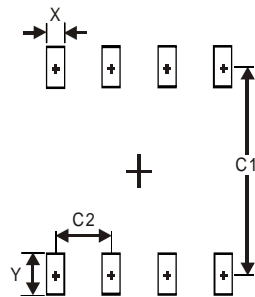


| SO-8 | | |
|-----------------------------|----------|------|
| Dim | Min | Max |
| A | - | 1.75 |
| A1 | 0.10 | 0.20 |
| A2 | 1.30 | 1.50 |
| A3 | 0.15 | 0.25 |
| b | 0.3 | 0.5 |
| D | 4.85 | 4.95 |
| E | 5.90 | 6.10 |
| E1 | 3.85 | 3.95 |
| e | 1.27 Typ | |
| h | - | 0.35 |
| L | 0.62 | 0.82 |
| θ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

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SO-8



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

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