

60V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ | I_D $T_A = 25^\circ C$ |
|---------------|----------------------------------|-----------------------------|
| -60V | 125m Ω @ $V_{GS} = -10V$ | -3.4A |
| | 190m Ω @ $V_{GS} = -4.5V$ | -2.8A |

Features and Benefits

- Fast switching speed
- Low input capacitance
- “Green” component and RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

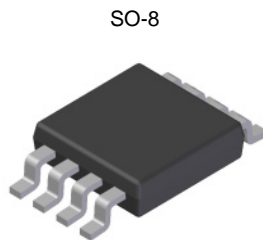
Description and Applications

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.

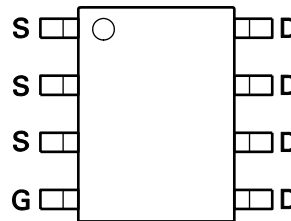
- Motor control
- Backlighting
- DC-DC Converters
- Power management functions

Mechanical Data

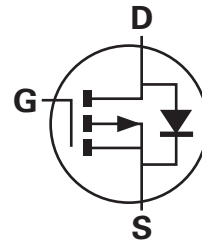
- Case: SO-8
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.074 grams (approximate)



Top View



Top View



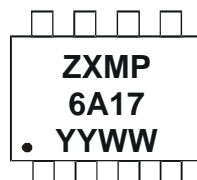
Equivalent Circuit

Ordering Information (Note 1)

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|-----------|--------------------|-----------------|-------------------|
| ZXMP6A17N8TC | See below | 13 | 12 | 2,500 |

Notes: 1. Diodes, Inc. defines “Green” products as those which are RoHS compliant and contain no halogens or antimony compounds; further information about Diodes Inc.’s “Green” Policy can be found on our website. For packaging details, go to our website.

Marking Information



ZXMP = Product Type Marking Code, Line 1
 6A17 = Product Type Marking Code, Line 2
 YYWW = Date Code Marking
 YY = Year (ex: 09 = 2009)
 WW = Week (01 - 53)

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

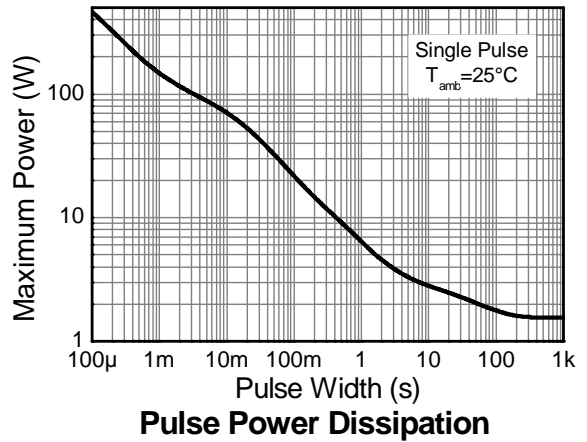
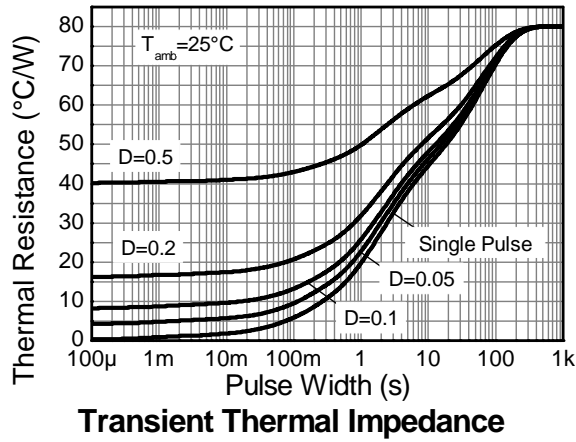
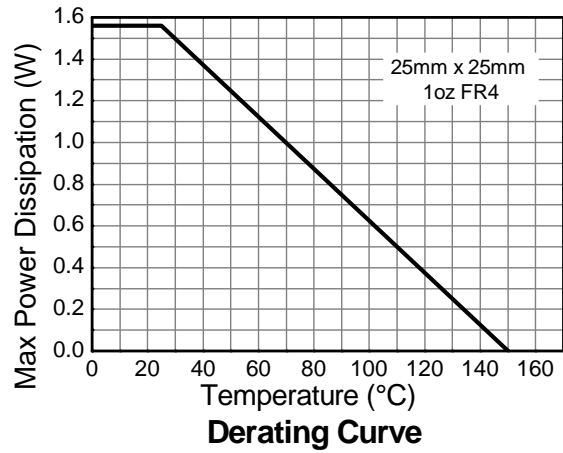
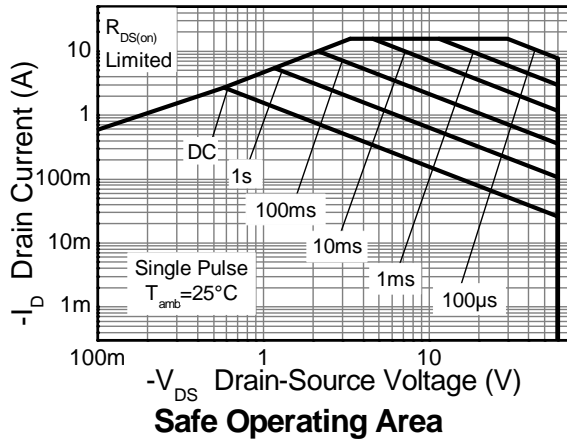
| Characteristic | | | Symbol | Value | Unit | |
|--|-----------------------|-----------------------------------|-----------|----------|-------|---|
| Drain-Source voltage | | | V_{DSS} | -60 | V | |
| Gate-Source voltage | | | V_{GS} | ± 20 | V | |
| Continuous Drain current | $V_{GS} = 10\text{V}$ | (Note 3) | I_D | -3.42 | A | |
| | | $T_A = 70^\circ\text{C}$ (Note 3) | | -2.73 | | |
| | | (Note 2) | | -2.7 | | |
| Pulsed Drain current | $V_{GS} = 10\text{V}$ | (Note 4) | I_{DM} | -15.6 | A | |
| Continuous Source current (Body diode) | | | (Note 3) | I_S | -3.4 | A |
| Pulsed Source current (Body diode) | | | (Note 4) | I_{SM} | -15.6 | A |

Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | | Symbol | Value | Unit |
|---|----------|-----------------|------------|--------------------|
| Power dissipation | (Note 2) | P_D | 1.56 | W |
| | | | 12.5 | |
| Linear derating factor | (Note 3) | | 2.5 | |
| | | | 20 | |
| Thermal Resistance, Junction to Ambient | (Note 2) | $R_{\theta JA}$ | 80 | $^\circ\text{C/W}$ |
| | (Note 3) | | 50 | |
| Thermal Resistance, Junction to Lead | (Note 5) | $R_{\theta JL}$ | 32 | |
| Operating and storage temperature range | | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ |

- Notes:
2. 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.
 3. Same as note (2), except the device is measured at $t \leq 10$ sec.
 4. Same as note (2), except the device is pulsed with $D = 0.02$ and pulse width 300 μs . The pulse current is limited by the maximum junction temperature.
 5. Thermal resistance from junction to solder-point (at the end of the drain lead).

Thermal Characteristics

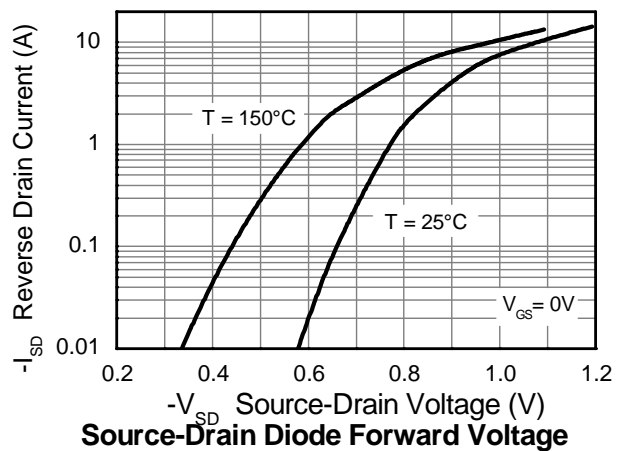
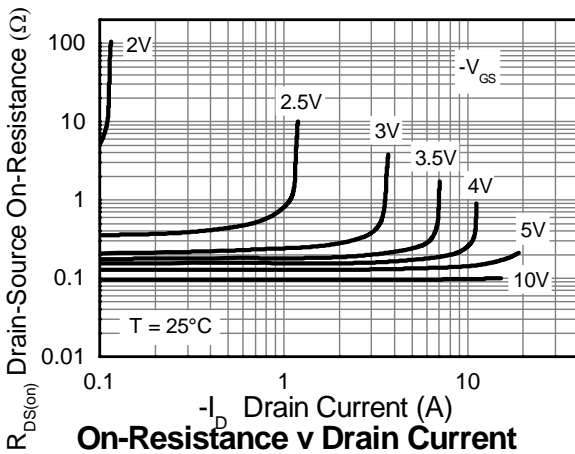
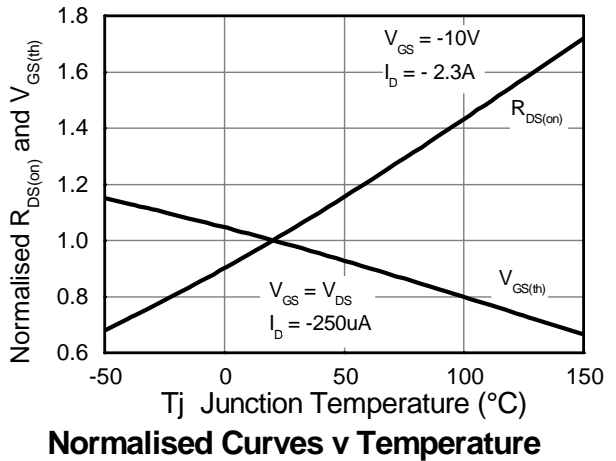
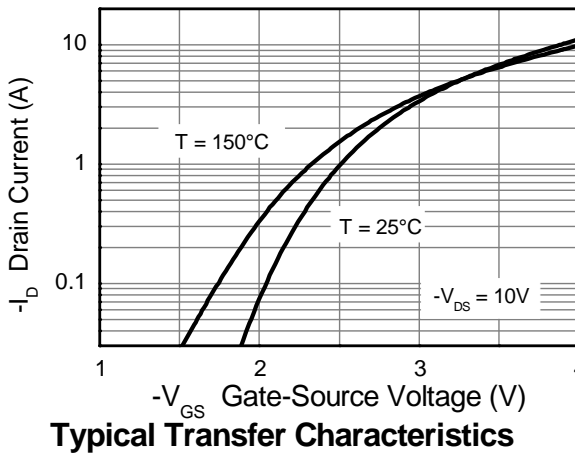
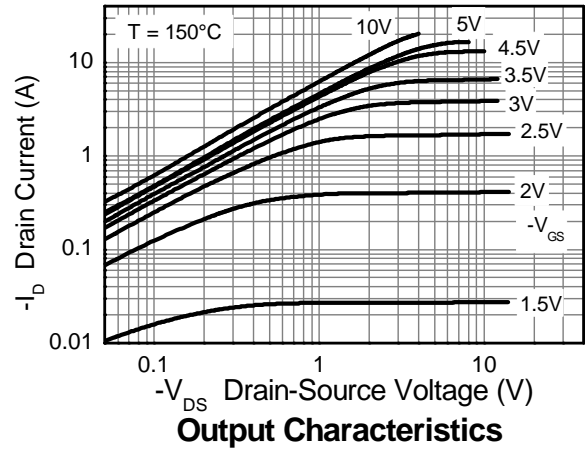
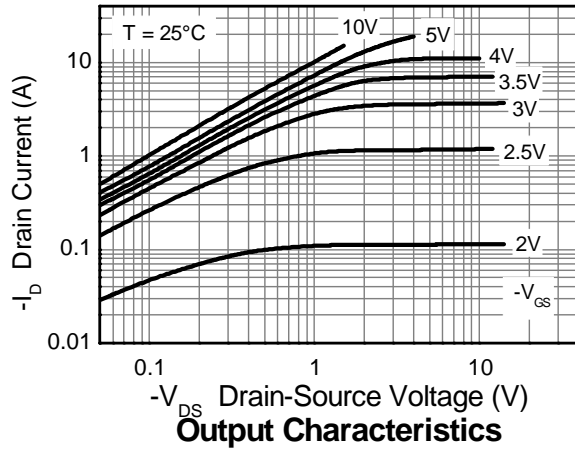


Electrical Characteristics @T_A = 25°C unless otherwise specified

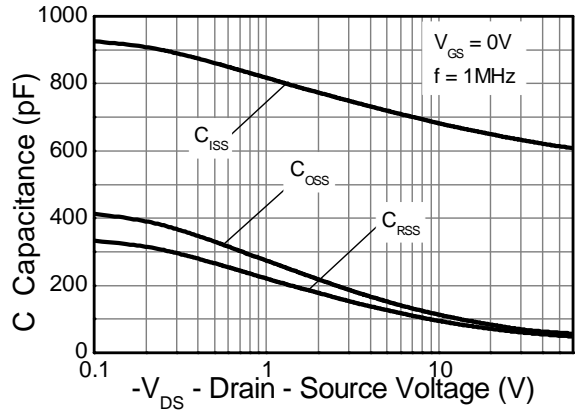
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|------|-------|-------|------|---|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -60 | — | — | V | I _D = -250μA, V _{GS} = 0V |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | -0.5 | 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 6) | R _{DS(on)} | — | — | 0.125 | Ω | V _{GS} = -10V, I _D = -2.3A |
| | | | | 0.190 | | V _{GS} = -4.5V, I _D = -1.9A |
| Forward Transconductance (Notes 6 & 7) | g _{fs} | — | 4.7 | — | S | V _{DS} = -15V, I _D = -2.3A |
| Diode Forward Voltage (Note 6) | V _{SD} | — | -0.85 | -0.95 | V | I _S = -2.0A, V _{GS} = 0V |
| Reverse recovery time (Note 7) | t _{rr} | — | 25.1 | — | ns | I _S = -1.7A, di/dt = 100A/μs |
| Reverse recovery charge (Note 7) | Q _{rr} | — | 27.2 | — | nC | |
| DYNAMIC CHARACTERISTICS (Note 7) | | | | | | |
| Input Capacitance | C _{iss} | — | 637 | — | pF | V _{DS} = -30V, V _{GS} = 0V f = 1MHz |
| Output Capacitance | C _{oss} | — | 70 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 53 | — | pF | |
| Total Gate Charge (Note 8) | Q _g | — | 9.0 | — | nC | V _{GS} = -4.5V |
| Total Gate Charge (Note 8) | Q _g | — | 17.7 | — | nC | V _{GS} = -10V |
| Gate-Source Charge (Note 8) | Q _{gs} | — | 1.6 | — | nC | |
| Gate-Drain Charge (Note 8) | Q _{gd} | — | 4.4 | — | nC | |
| Turn-On Delay Time (Note 8) | t _{D(on)} | — | 2.6 | — | ns | V _{DD} = -30V, V _{GS} = -10V I _D = -1A, R _G ≅ 6.0Ω |
| Turn-On Rise Time (Note 8) | t _r | — | 3.4 | — | ns | |
| Turn-Off Delay Time (Note 8) | t _{D(off)} | — | 26.2 | — | ns | |
| Turn-Off Fall Time (Note 8) | t _f | — | 11.3 | — | ns | |

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

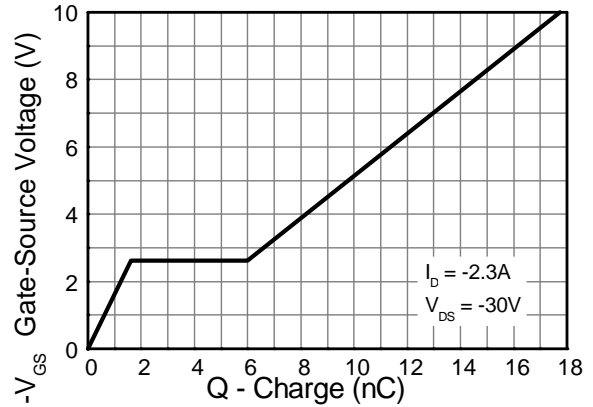
Typical Characteristics



Typical Characteristics - continued

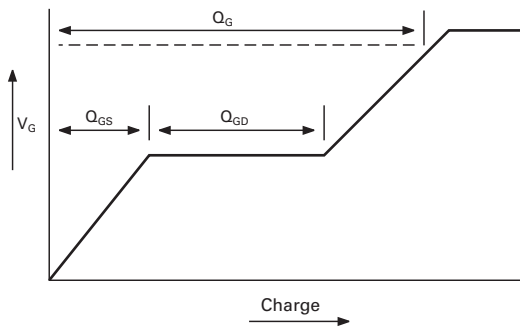


Capacitance v Drain-Source Voltage

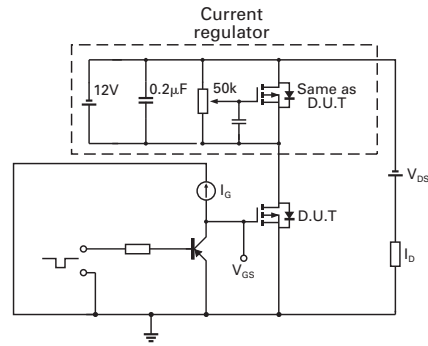


Gate-Source Voltage v Gate Charge

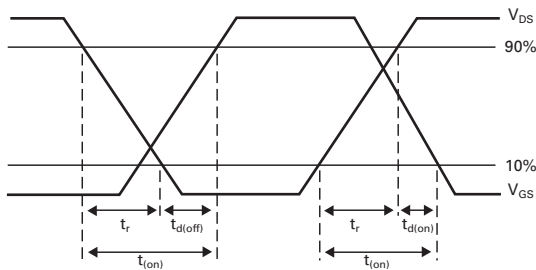
Test Circuits



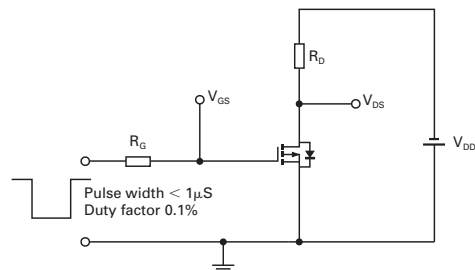
Basic gate charge waveform



Gate charge test circuit

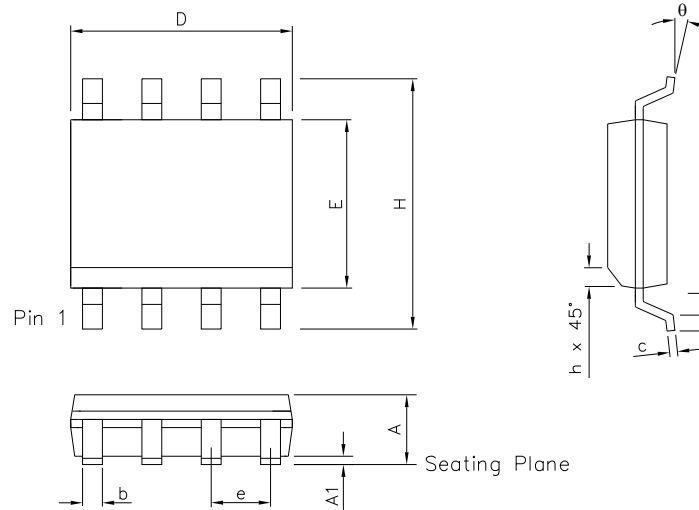


Switching time waveforms



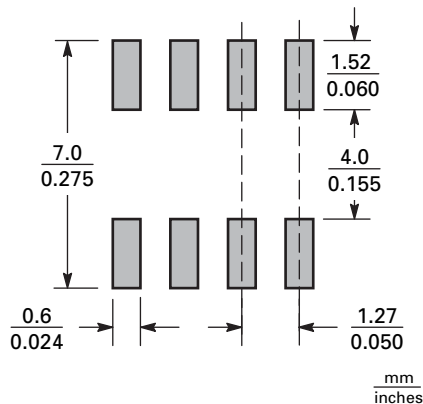
Switching time test circuit

Package Outline Dimensions



| DIM | Inches | | Millimeters | | DIM | Inches | | Millimeters | |
|-----|--------|-------|-------------|------|-------|-----------|-------|-------------|------|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | 0.053 | 0.069 | 1.35 | 1.75 | e | 0.050 BSC | | 1.27 BSC | |
| A1 | 0.004 | 0.010 | 0.10 | 0.25 | b | 0.013 | 0.020 | 0.33 | 0.51 |
| D | 0.189 | 0.197 | 4.80 | 5.00 | c | 0.008 | 0.010 | 0.19 | 0.25 |
| H | 0.228 | 0.244 | 5.80 | 6.20 | theta | 0° | 8° | 0° | 8° |
| E | 0.150 | 0.157 | 3.80 | 4.00 | h | 0.010 | 0.020 | 0.25 | 0.50 |
| L | 0.016 | 0.050 | 0.40 | 1.27 | - | - | - | - | - |

Suggested Pad Layout



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