

ZXMP6A17E6

60V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

| | | |
|---------------|---|---|
| $V_{(BR)DSS}$ | $R_{DS(on)}$ Max | I_D Max $T_A = 25^\circ\text{C}$ (Note 5) |
| -60V | 125m Ω @ $V_{GS} = -10\text{V}$ | -3.0 A |
| | 190m Ω @ $V_{GS} = -4.5\text{V}$ | -2.4 A |

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.

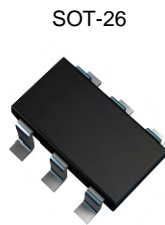
- DC-DC Converters
- Power management functions
- Disconnect switches
- Motor control

Features and Benefits

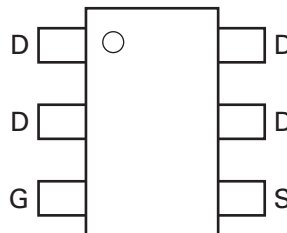
- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- Low input capacitance
- "Lead Free", RoHS Compliant (Note 1)
- Halogen and Antimony Free. "Green" Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

Mechanical Data

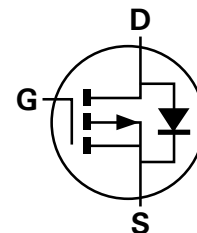
- Case: SOT-26
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.018 grams (approximate)



Top View



Pin Out - Top View



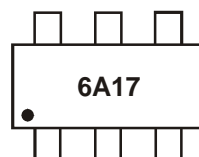
Equivalent Circuit

Ordering Information (Note 3)

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|---------|--------------------|-----------------|-------------------|
| ZXMP6A17E6TA | 6A17 | 7 | 8 | 3,000 |

- Notes:
1. No purposefully added lead
 2. Diodes Inc's "Green" policy can be found on our website at <http://www.diodes.com>.
 3. For packaging details, go to our website at <http://www.diodes.com>.

Marking Information



6A17 = Product Type Marking Code

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

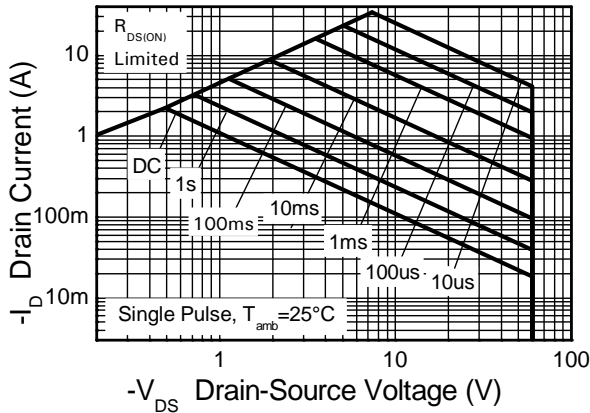
| Characteristic | | | Symbol | Value | Unit | |
|--|-----------------------|-----------------------------------|-----------|----------|-------|---|
| Drain-Source voltage | | | V_{DSS} | -60 | V | |
| Gate-Source voltage | | | V_{GS} | ± 20 | V | |
| Continuous Drain current | $V_{GS} = 10\text{V}$ | (Note 5) | I_D | -3.0 | A | |
| | | $T_A = 70^\circ\text{C}$ (Note 5) | | -2.4 | | |
| | | (Note 4) | | -2.3 | | |
| Pulsed Drain current | $V_{GS} = 10\text{V}$ | (Note 6) | I_{DM} | -13.6 | A | |
| Continuous Source current (Body diode) | | | (Note 5) | I_S | -2.5 | A |
| Pulsed Source current (Body diode) | | | (Note 6) | I_{SM} | -13.6 | A |

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

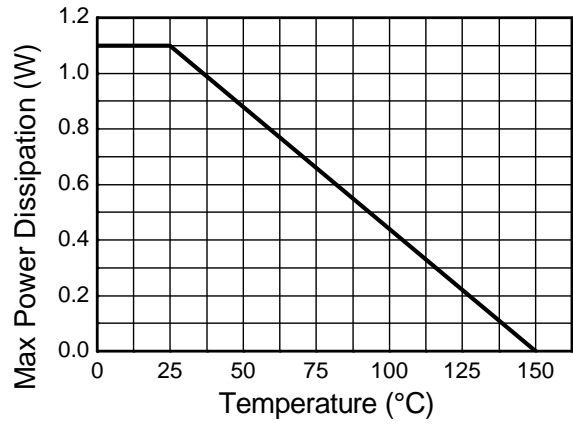
| Characteristic | | | Symbol | Value | Unit |
|---|--|----------|-----------------|--------------|---------------------------|
| Power dissipation Linear derating factor | | (Note 4) | P_D | 1.1 | W mW/ $^\circ\text{C}$ |
| | | | | 8.8 | |
| | | (Note 5) | | 1.92 15.4 | |
| Thermal Resistance, Junction to Ambient | | (Note 4) | $R_{\theta JA}$ | 113 | $^\circ\text{C}/\text{W}$ |
| | | (Note 5) | | 65 | |
| Operating and storage temperature range | | | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ |

- Notes:
4. 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.
 5. Same as note (4), except the device is measured at $t \leq 5$ sec.
 6. Same as note (4), except the device is pulsed with $D = 0.02$ and pulse width 300 μs . The pulse current is limited by the maximum junction temperature.

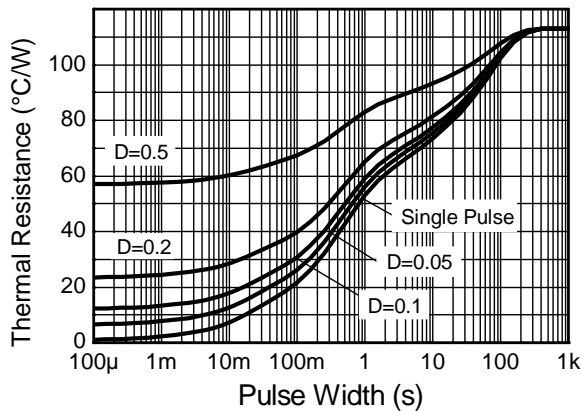
Thermal Characteristics



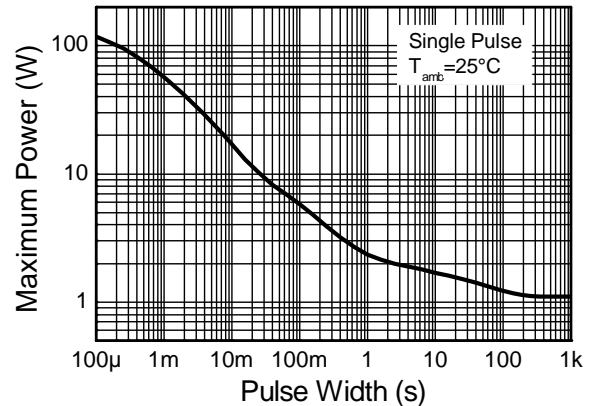
P-channel Safe Operating Area



Derating Curve



Transient Thermal Impedance



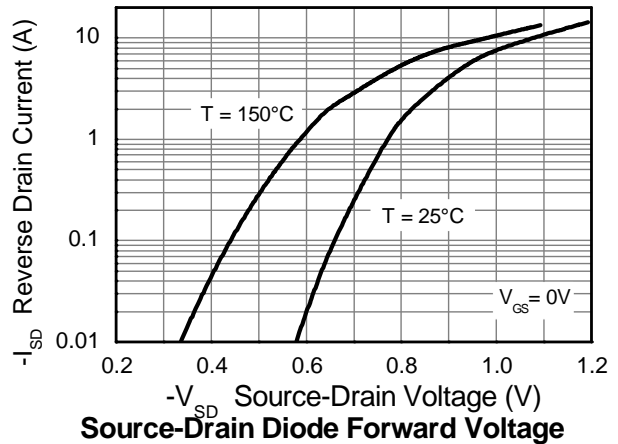
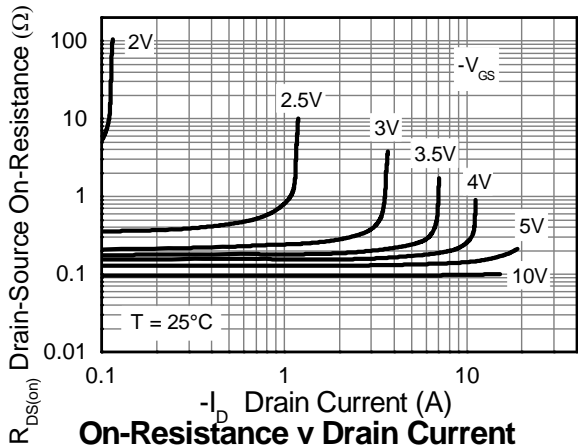
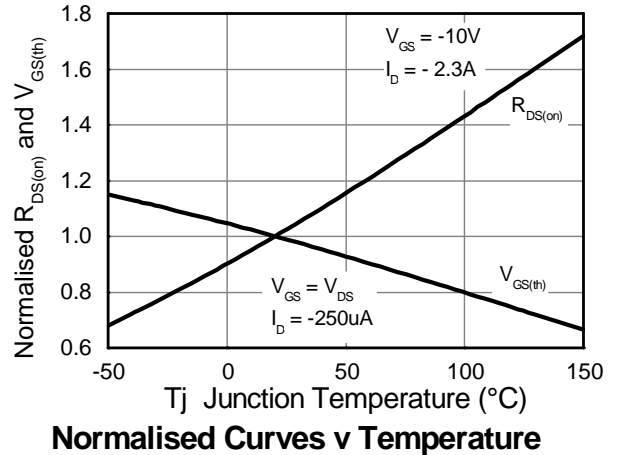
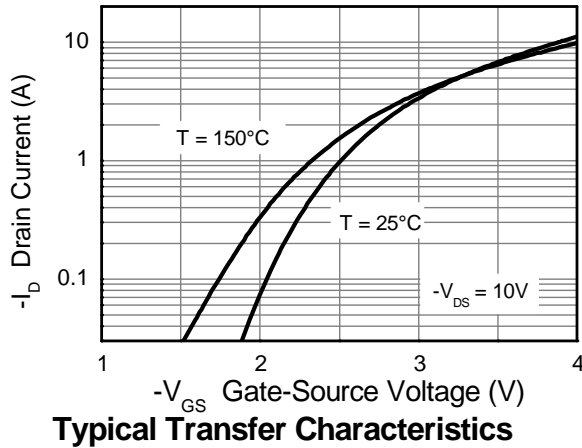
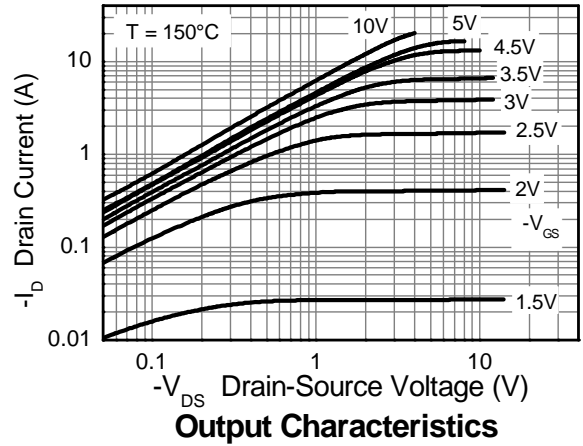
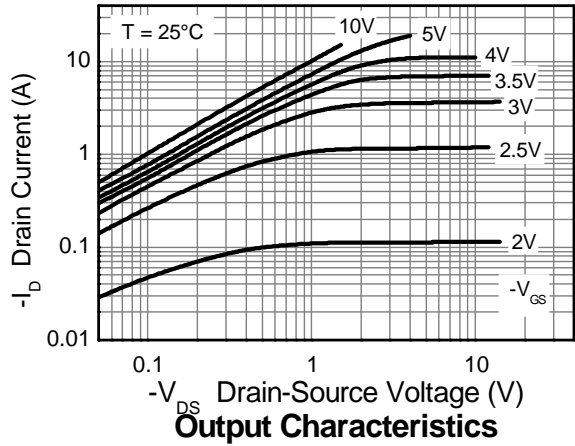
Pulse Power Dissipation

Electrical Characteristics @T_A = 25°C unless otherwise specified

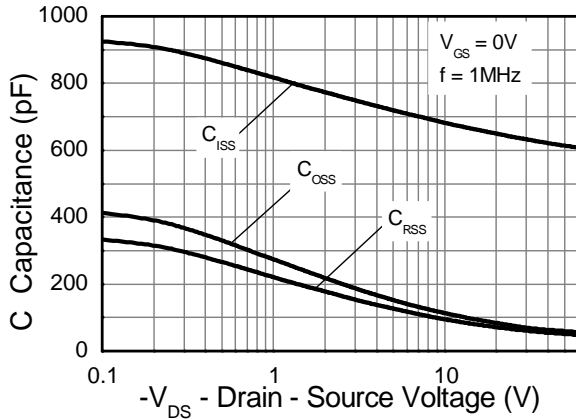
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|------|-------|-------|------|---|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -60 | — | — | V | I _D = -250μA, V _{GS} = 0V |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | -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 | — | -3.0 | V | I _D = -250μA, V _{DS} = V _{GS} |
| Static Drain-Source On-Resistance (Note 7) | R _{DS(on)} | — | 0.100 | 0.125 | Ω | V _{GS} = -10V, I _D = -2.3A |
| | | | 0.130 | 0.190 | | V _{GS} = -4.5V, I _D = -1.9A |
| Forward Transconductance (Notes 7 & 8) | g _{fs} | — | 4.7 | — | S | V _{DS} = -15V, I _D = -2.3A |
| Diode Forward Voltage (Note 7) | V _{SD} | — | -0.85 | -0.95 | V | I _S = -2A, V _{GS} = 0V |
| Reverse recovery time (Note 8) | t _{rr} | — | 25.1 | — | ns | I _F = -1.7A, di/dt = 100A/μs |
| Reverse recovery charge (Note 8) | Q _{rr} | — | 27.2 | — | nC | |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| 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 9) | Q _g | — | 9.8 | — | nC | V _{GS} = -5.0V |
| Total Gate Charge (Note 9) | Q _g | — | 17.7 | — | nC | V _{GS} = -10V V _{DS} = -30V I _D = -2.3A |
| Gate-Source Charge (Note 9) | Q _{gs} | — | 1.6 | — | nC | |
| Gate-Drain Charge (Note 9) | Q _{gd} | — | 4.4 | — | nC | |
| Turn-On Delay Time (Note 9) | t _{D(on)} | — | 2.6 | — | ns | V _{DD} = -30V, V _{GS} = -10V I _D = -1A, R _G ≅ 6.0Ω |
| Turn-On Rise Time (Note 9) | t _r | — | 3.4 | — | ns | |
| Turn-Off Delay Time (Note 9) | t _{D(off)} | — | 26.2 | — | ns | |
| Turn-Off Fall Time (Note 9) | t _f | — | 11.3 | — | ns | |

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

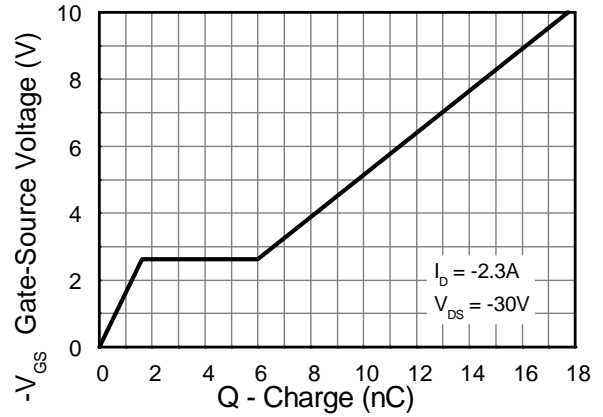
Typical Characteristics



Typical Characteristics - continued

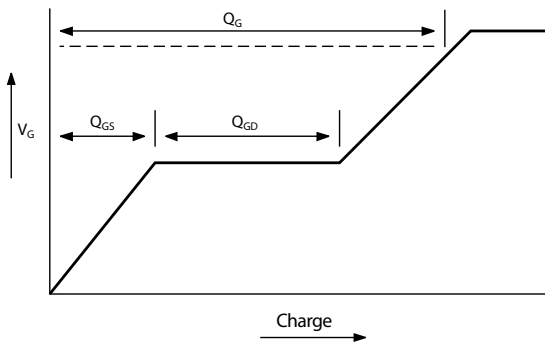


Capacitance v Drain-Source Voltage

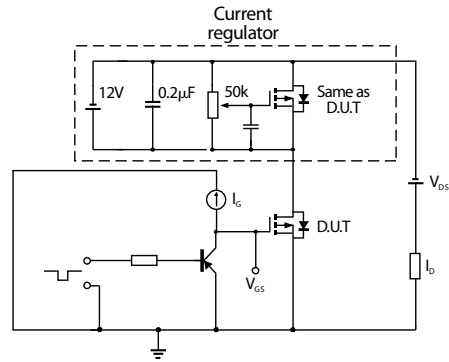


Gate-Source Voltage v Gate Charge

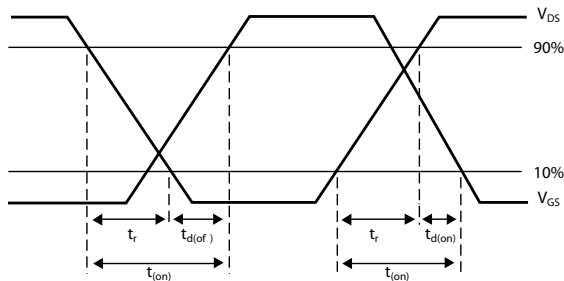
Test Circuits



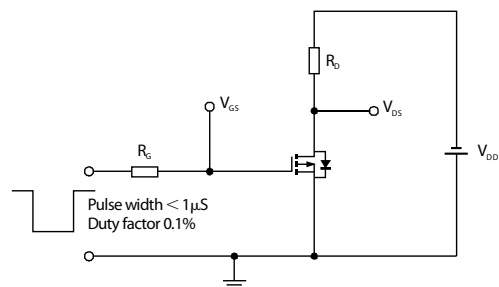
Basic gate charge waveform



Gate charge test circuit

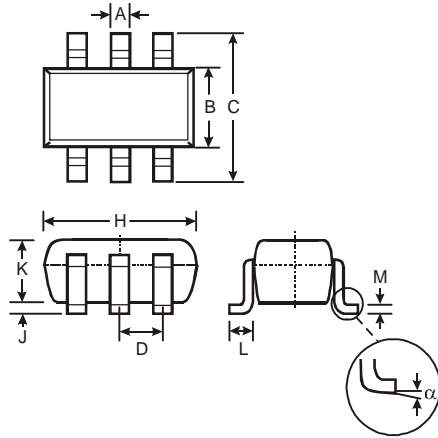


Switching time waveforms



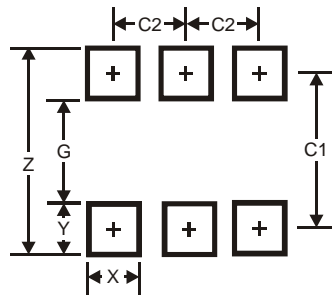
Switching time test circuit

Package Outline Dimensions



| SOT-26 | | | |
|----------------------|-------|------|------|
| Dim | Min | Max | Typ |
| A | 0.35 | 0.50 | 0.38 |
| B | 1.50 | 1.70 | 1.60 |
| C | 2.70 | 3.00 | 2.80 |
| D | — | — | 0.95 |
| H | 2.90 | 3.10 | 3.00 |
| J | 0.013 | 0.10 | 0.05 |
| K | 1.00 | 1.30 | 1.10 |
| L | 0.35 | 0.55 | 0.40 |
| M | 0.10 | 0.20 | 0.15 |
| α | 0° | 8° | — |
| All Dimensions in mm | | | |

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 3.20 |
| G | 1.60 |
| X | 0.55 |
| Y | 0.80 |
| C1 | 2.40 |
| C2 | 0.95 |

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