

**ZXMP6A17E6**

**60V P-CHANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

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

**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**

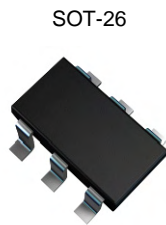
**Description and Applications**

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.

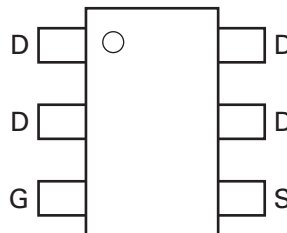
- DC-DC Converters
- Power management functions
- Disconnect switches
- Motor control

**Mechanical Data**

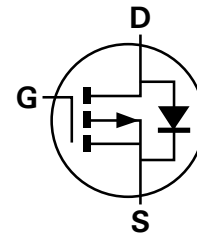
- Case: SOT-26
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.018 grams (approximate)



Top View



Pin Out - Top View



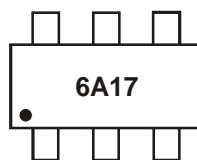
Equivalent Circuit

**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

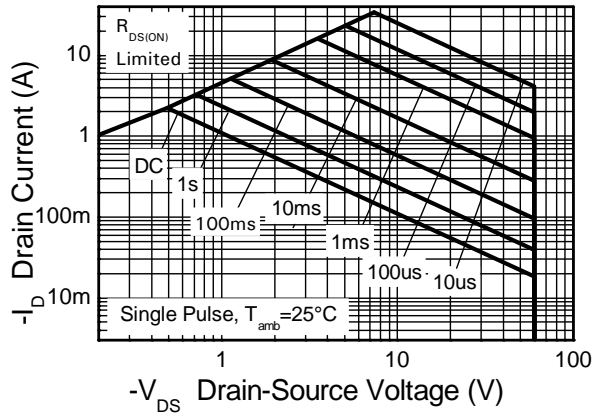
Characteristic			Symbol	Value	Unit	
Drain-Source voltage			$V_{DSS}$	-60	V	
Gate-Source voltage			$V_{GS}$	$\pm 20$	V	
Continuous Drain current	$V_{GS} = 10\text{V}$	(Note 5)	$I_D$	-3.0	A	
		$T_A = 70^\circ\text{C}$ (Note 5)		-2.4		
		(Note 4)		-2.3		
Pulsed Drain current	$V_{GS} = 10\text{V}$	(Note 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

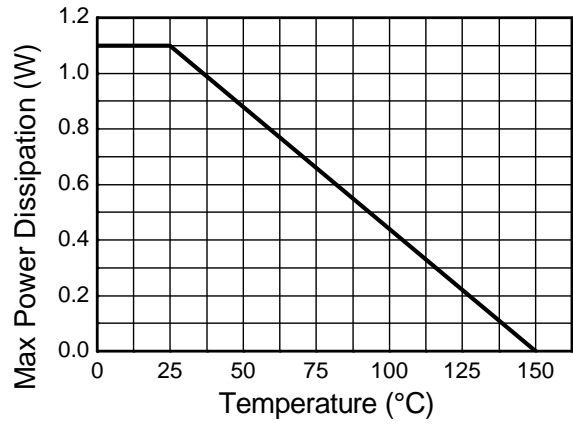
Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Note 4)	$P_D$	1.1	W mW/ $^\circ\text{C}$
			8.8	
	(Note 5)		1.92 15.4	
Thermal Resistance, Junction to Ambient	(Note 4)	$R_{\theta JA}$	113	$^\circ\text{C}/\text{W}$
	(Note 5)		65	
Operating and storage temperature range		$T_J, T_{STG}$	-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  $\mu\text{s}$ . The pulse current is limited by the maximum junction temperature.

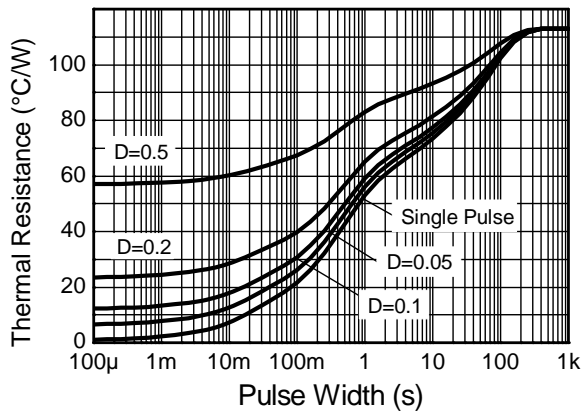
**Thermal Characteristics**



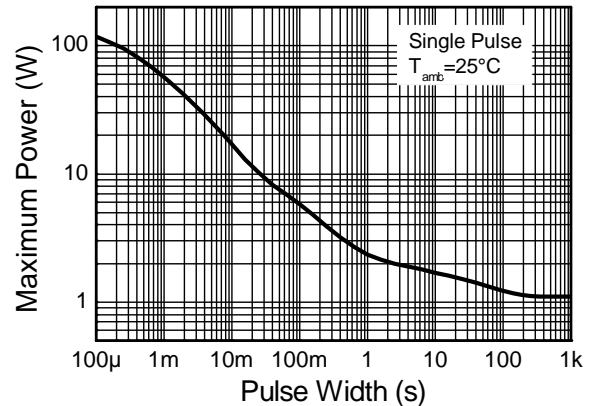
**P-channel Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**



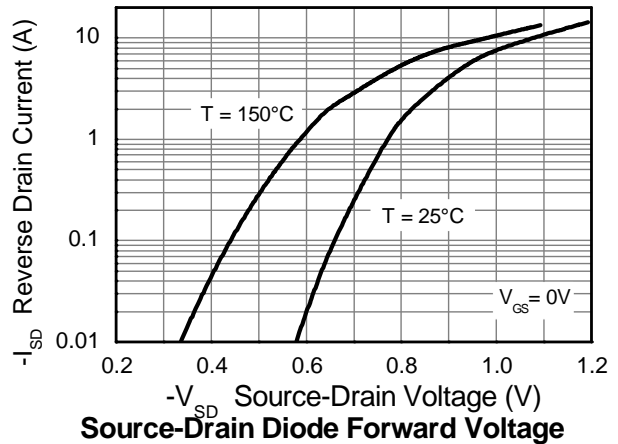
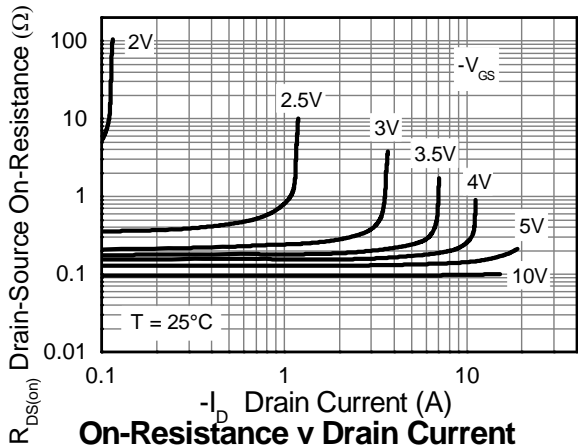
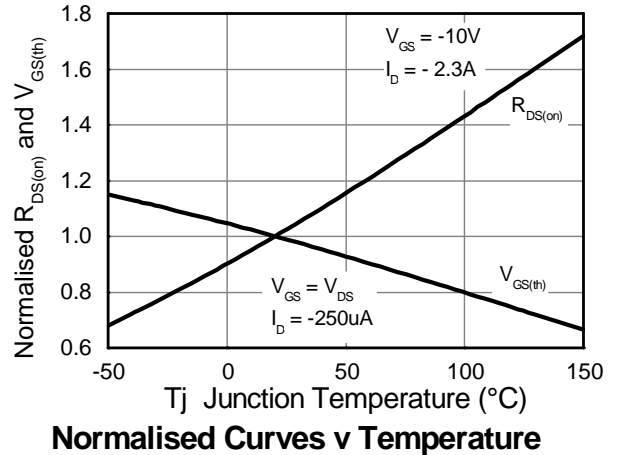
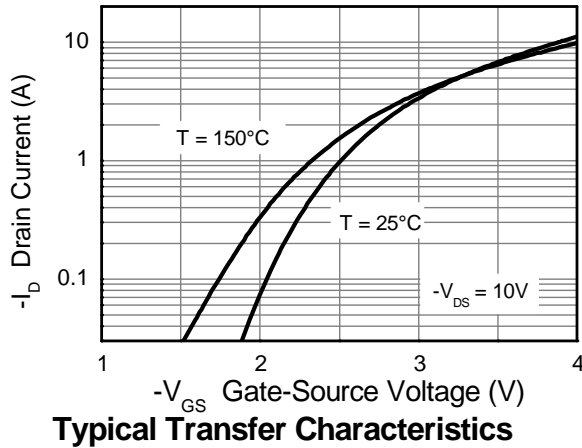
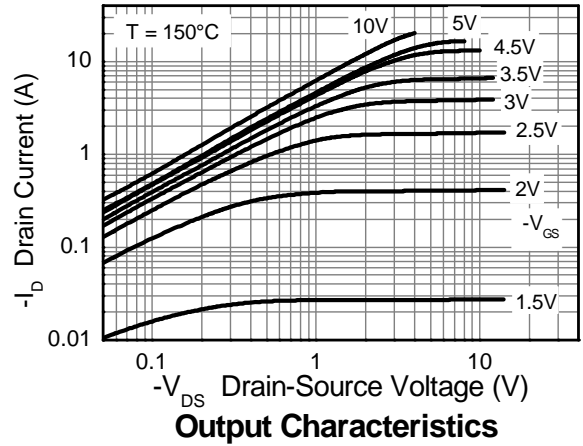
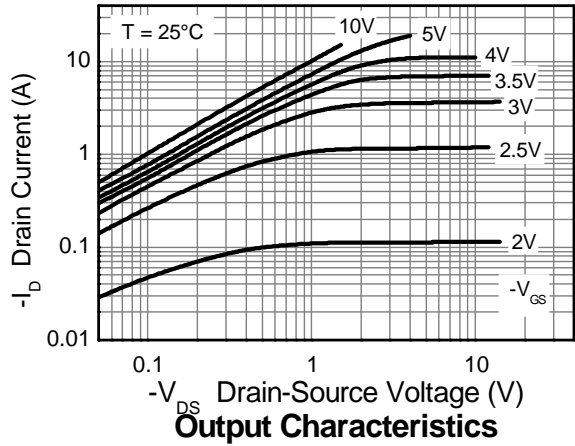
**Pulse Power Dissipation**

**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

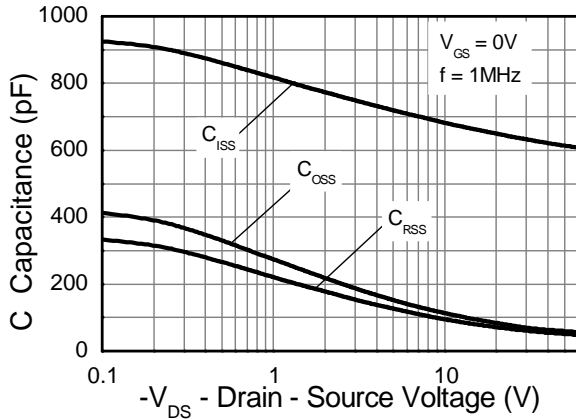
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-60	—	—	V	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-1.0	μA	V <sub>DS</sub> = -60V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-1.0	—	-3.0	V	I <sub>D</sub> = -250μA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-Resistance (Note 7)	R <sub>DS(on)</sub>	—	0.100	0.125	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -2.3A
			0.130	0.190		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -1.9A
Forward Transconductance (Notes 7 & 8)	g <sub>fs</sub>	—	4.7	—	S	V <sub>DS</sub> = -15V, I <sub>D</sub> = -2.3A
Diode Forward Voltage (Note 7)	V <sub>SD</sub>	—	-0.85	-0.95	V	I <sub>S</sub> = -2A, V <sub>GS</sub> = 0V
Reverse recovery time (Note 8)	t <sub>rr</sub>	—	25.1	—	ns	I <sub>F</sub> = -1.7A, di/dt = 100A/μs
Reverse recovery charge (Note 8)	Q <sub>rr</sub>	—	27.2	—	nC	
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iSS</sub>	—	637	—	pF	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oSS</sub>	—	70	—	pF	
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	53	—	pF	
Total Gate Charge (Note 9)	Q <sub>g</sub>	—	9.8	—	nC	V <sub>GS</sub> = -5.0V
Total Gate Charge (Note 9)	Q <sub>g</sub>	—	17.7	—	nC	V <sub>GS</sub> = -10V V <sub>DS</sub> = -30V I <sub>D</sub> = -2.3A
Gate-Source Charge (Note 9)	Q <sub>gs</sub>	—	1.6	—	nC	
Gate-Drain Charge (Note 9)	Q <sub>gd</sub>	—	4.4	—	nC	
Turn-On Delay Time (Note 9)	t <sub>D(on)</sub>	—	2.6	—	ns	V <sub>DD</sub> = -30V, V <sub>GS</sub> = -10V I <sub>D</sub> = -1A, R <sub>G</sub> ≅ 6.0Ω
Turn-On Rise Time (Note 9)	t <sub>r</sub>	—	3.4	—	ns	
Turn-Off Delay Time (Note 9)	t <sub>D(off)</sub>	—	26.2	—	ns	
Turn-Off Fall Time (Note 9)	t <sub>f</sub>	—	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.

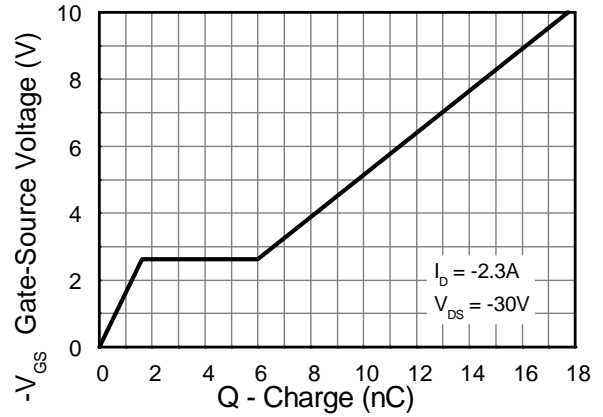
**Typical Characteristics**



**Typical Characteristics - continued**

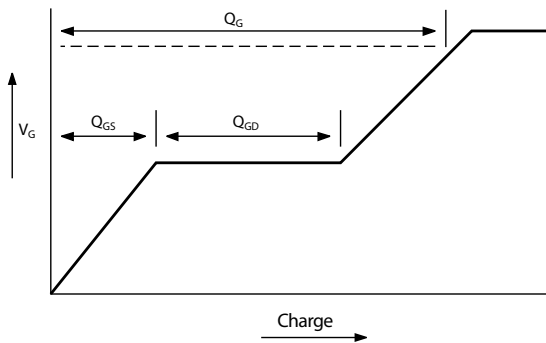


**Capacitance v Drain-Source Voltage**

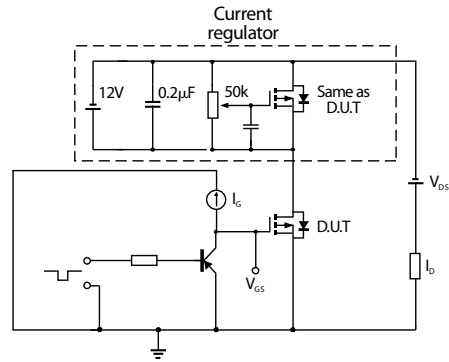


**Gate-Source Voltage v Gate Charge**

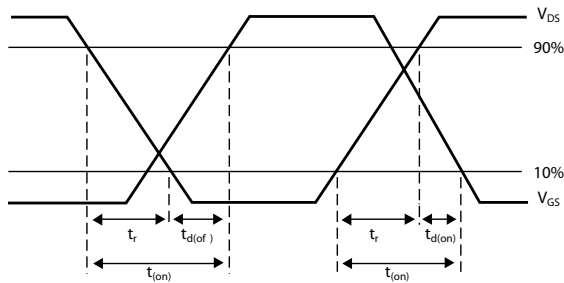
**Test Circuits**



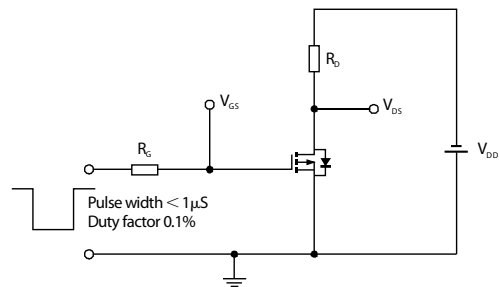
**Basic gate charge waveform**



**Gate charge test circuit**

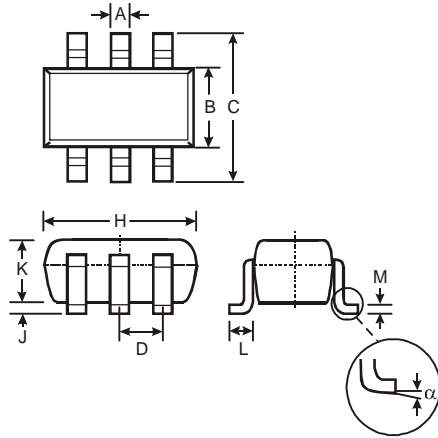


**Switching time waveforms**



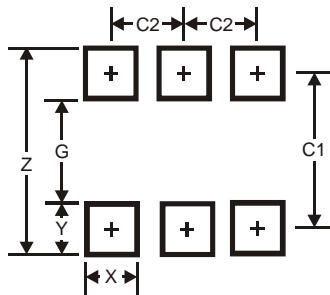
**Switching time test circuit**

**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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