

60V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D $T_A = +25^\circ C$
-60V	125m Ω @ $V_{GS} = -10V$	-4.3A
	190m Ω @ $V_{GS} = -4.5V$	-3.5A

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.

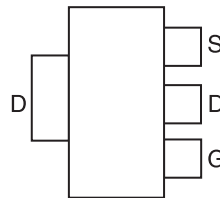
Applications

- Motor Control
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply

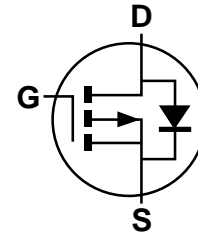
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

Features and Benefits

- Fast Switching Speed
- Low Gate Drive
- Low Input Capacitance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Mechanical Data

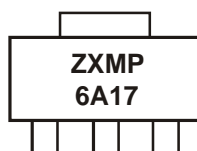
- Case: SOT223
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.112 grams (approximate)

Ordering Information (Note 4 & 5)

Part Number	Compliance	Case	Quantity per reel
ZXMP6A17GTA	Standard	SOT223	1,000
ZXMP6A17GQTA	Automotive	SOT223	1,000

- Note:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_grade_definitions/.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



ZXMP = Product Type Marking Code, Line 1
6A17 = Product Type Marking Code, Line 2

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

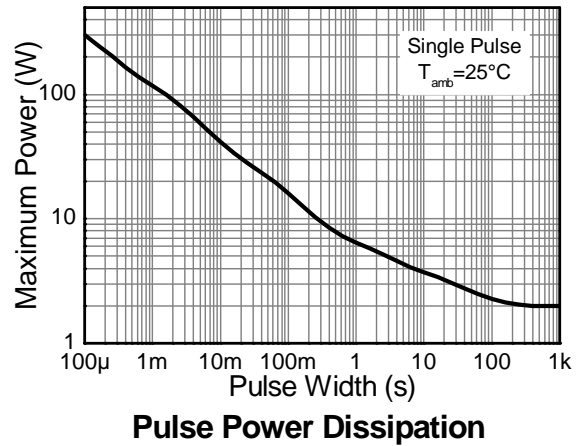
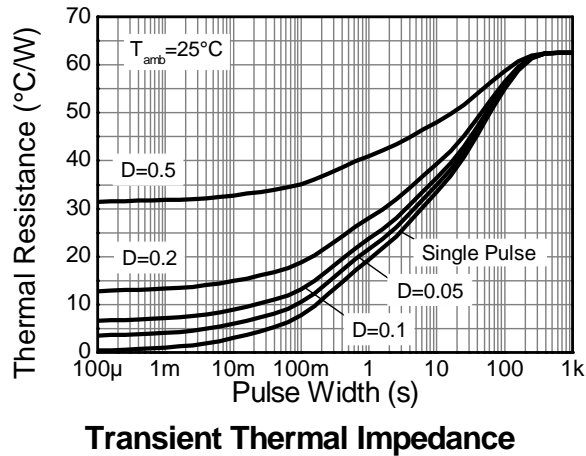
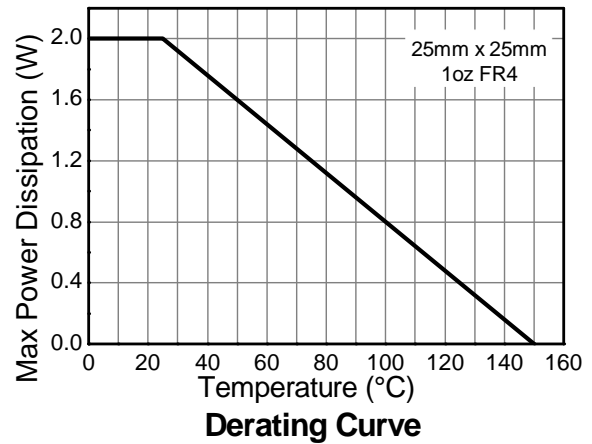
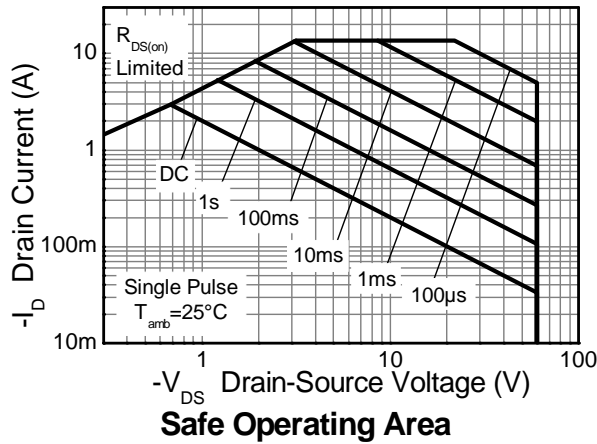
Characteristic			Symbol	Value	Unit	
Drain-Source Voltage			V _{DSS}	-60	V	
Gate-Source Voltage			V _{GS}	±20	V	
Continuous Drain Current	V _{GS} = 10V	(Note 7)	I _D	-4.3	A	
		T _A = +70°C (Note 7)		-3.5		
		(Note 6)		-3.0		
Pulsed Drain Current	V _{GS} = 10V	(Note 8)	I _{DM}	-13.7	A	
Continuous Source Current (Body Diode)			(Note 7)	I _S	-4.8	A
Pulsed Source Current (Body Diode)			(Note 8)	I _{SM}	-13.7	A

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P _D	2.0	W
	(Note 7)		16	
Linear Derating Factor	(Note 6)	R _{θJA}	3.9	mW/°C
	(Note 7)		31	
Thermal Resistance, Junction to Ambient	(Note 6)	R _{θJA}	62.5	°C/W
	(Note 7)		32.0	
Thermal Resistance, Junction to Lead	(Note 9)	R _{θJL}	9.8	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

- Notes:
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 (6), except the device is measured at t ≤ 10sec.
 8. Same as note (6), except the device is pulsed with D = 0.02 and pulse width 300µs. The pulse current is limited by the maximum junction temperature.
 9. Thermal resistance from junction to solder-point (at the end of the drain lead).

Thermal Characteristics

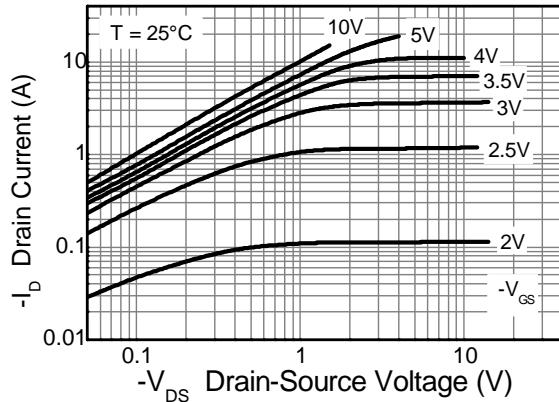


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

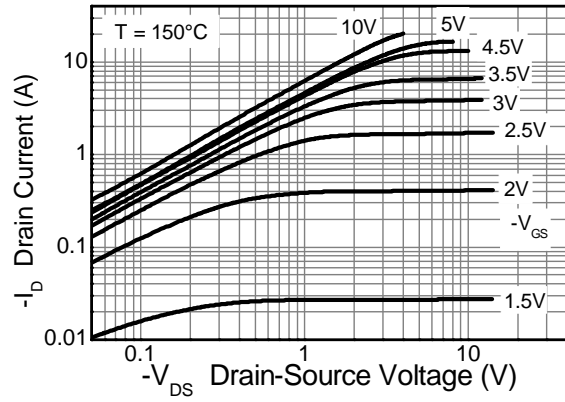
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	-60	—	—	V	I _D = -250μA, V _{GS} = 0V
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-0.5	μA	V _{DS} = -60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 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 10)	R _{DS(on)}	—	0.096	0.125	Ω	V _{GS} = -10V, I _D = -2.2A
			0.120	0.190		V _{GS} = -4.5V, I _D = -1.8A
Forward Transconductance (Notes 10 & 11)	g _{fs}	—	4.7	—	S	V _{DS} = -15V, I _D = -2.2A
Diode Forward Voltage (Note 10)	V _{SD}	—	-0.85	-0.95	V	I _S = -2.0A, V _{GS} = 0V, T _J = +25°C
Reverse recovery time (Note 11)	t _{rr}	—	25.1	—	ns	I _S = -1.7A, di/dt = 100A/μs,
Reverse recovery charge (Note 11)	Q _{rr}	—	27.2	—	nC	T _J = +25°C
DYNAMIC CHARACTERISTICS (Note 11)						
Input Capacitance	C _{iss}	—	637	—	pF	V _{DS} = -30V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	70.0	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	53.0	—	pF	
Total Gate Charge (Note 12)	Q _g	—	9.0	—	nC	V _{GS} = -4.5V
Total Gate Charge (Note 12)	Q _g	—	17.7	—	nC	V _{GS} = -10V
Gate-Source Charge (Note 12)	Q _{gs}	—	1.6	—	nC	
Gate-Drain Charge (Note 12)	Q _{gd}	—	4.4	—	nC	
Turn-On Delay Time (Note 12)	t _{D(on)}	—	2.6	—	ns	V _{DD} = -30V, V _{GS} = -10V I _D = -1A, R _G ≅ 6.0Ω
Turn-On Rise Time (Note 12)	t _r	—	3.4	—	ns	
Turn-Off Delay Time (Note 12)	t _{D(off)}	—	26.2	—	ns	
Turn-Off Fall Time (Note 12)	t _f	—	11.3	—	ns	

Notes: 10. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
 11. For design aid only, not subject to production testing.
 12. Switching characteristics are independent of operating junction temperatures.

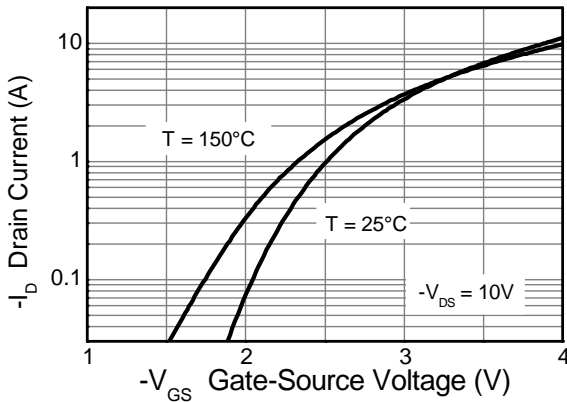
Typical Characteristics



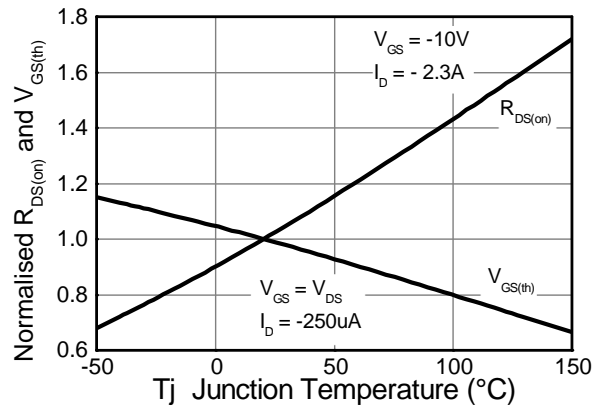
Output Characteristics



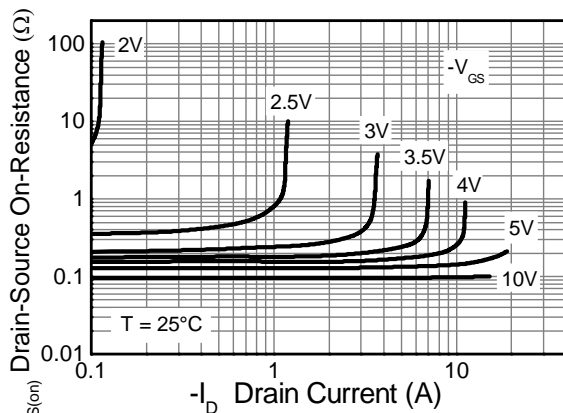
Output Characteristics



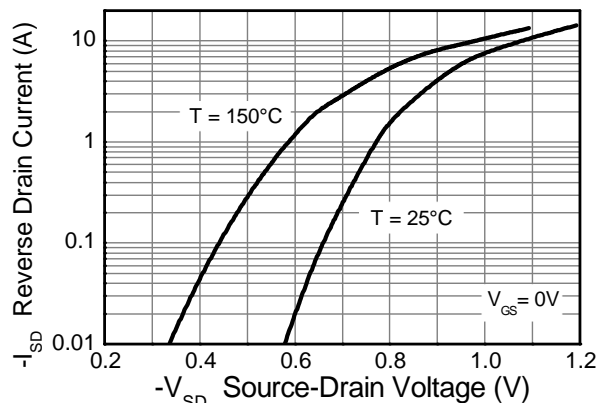
Typical Transfer Characteristics



Normalised Curves v Temperature

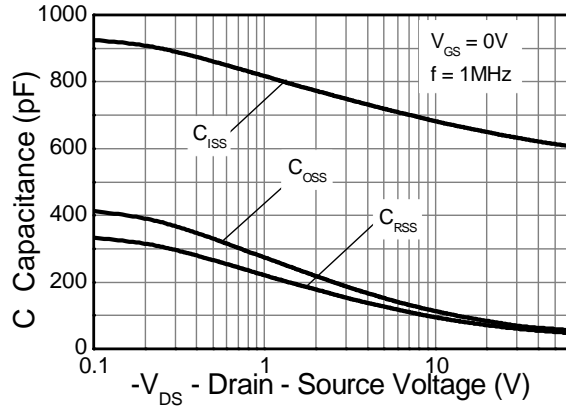


On-Resistance v Drain Current

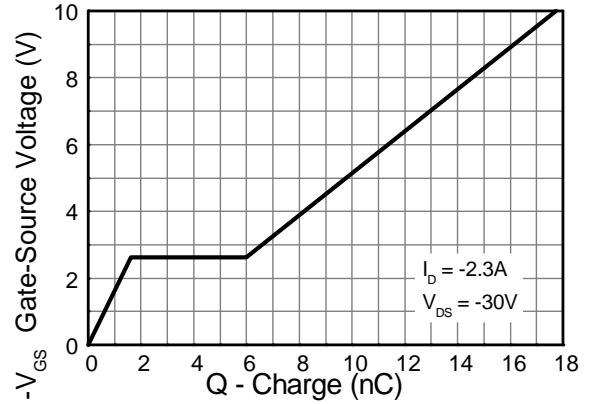


Source-Drain Diode Forward Voltage

Typical Characteristics – (cont.)

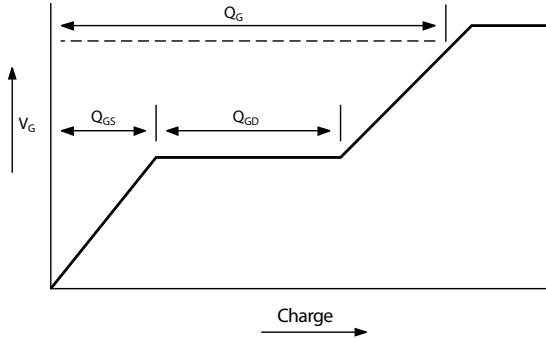


Capacitance v Drain-Source Voltage

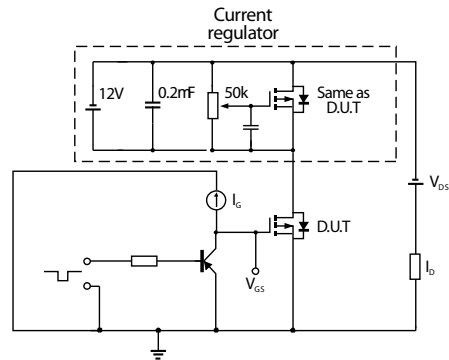


Gate-Source Voltage v Gate Charge

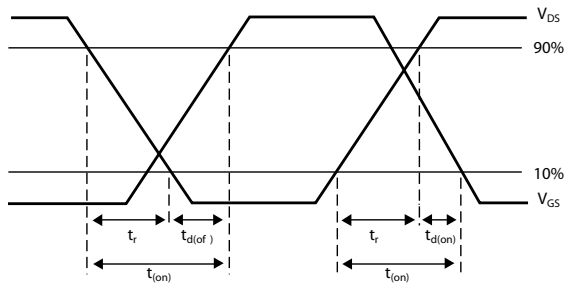
Test Circuits



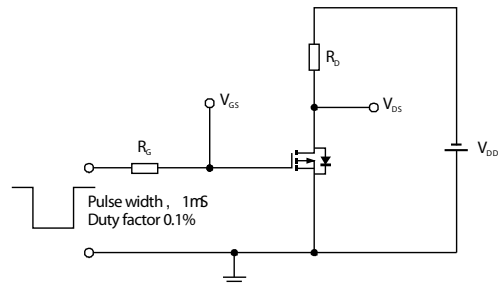
Basic gate charge waveform



Gate charge test circuit



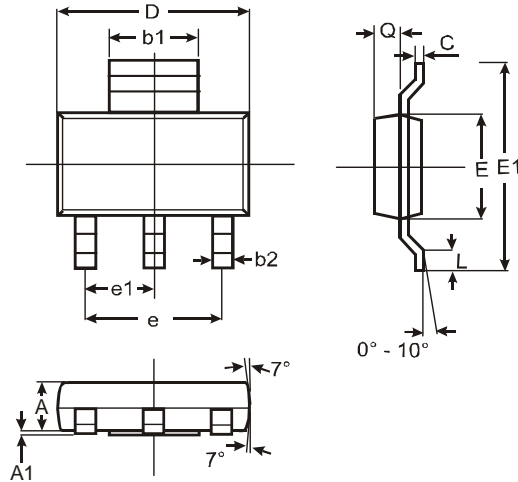
Switching time waveforms



Switching time test circuit

Package Outline Dimensions

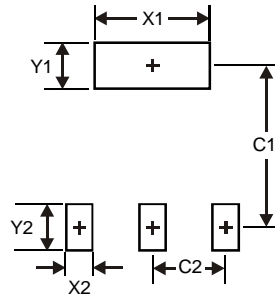
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b1	2.90	3.10	3.00
b2	0.60	0.80	0.70
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	—	—	4.60
e1	—	—	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for latest version.



Dimensions	Value (in mm)
X1	3.3
X2	1.2
Y1	1.6
Y2	1.6
C1	6.4
C2	2.3

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