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Green

ZXMP6A13G

60V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D T_A = +25°C
-60V	390mΩ @ V_{GS} = -10V	-2.3A
	595mΩ @ V_{GS} = -4.5V	-1.9A

Description and Applications

This MOSFET is designed to minimize the on-state resistance yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

- Motor control
- DC-DC converters
- Power-management functions
- Uninterrupted power supplies

Features and Benefits

- Fast Switching Speed
- Low Gate Drive
- Low Input Capacitance
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at https://www.diodes.com/products/automotive/automotive-products/.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. https://www.diodes.com/quality/product-definitions/**

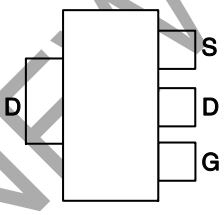
Mechanical Data

- Package: SOT223
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.112 grams (Approximate)

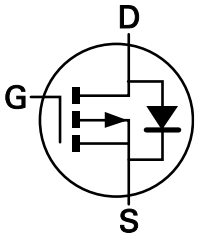
SOT223 (Type DN)



Top View



Pin Out - Top View



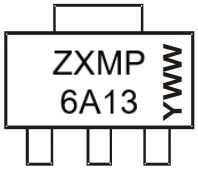
Equivalent Circuit

Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
ZXMP6A13GTA	SOT223 (Type DN)	1,000	Tape & Reel

Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
2. See https://www.diodes.com/quality/lead-free/ 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 https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



ZXMP6A13 = Product Type Marking Code
YWW = Date Code Marking
Y or $\overline{Y}$ = Last Digit of Year (ex: 6 = 2026)
WW or $\overline{WW}$ = Week Code (01 to 53)

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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 6)	I_D	-2.3	A
		T_A = +70°C (Note 6)		-1.9	
		(Note 5)		-1.7	
Pulsed Drain Current	V_{GS} = 10V	(Note 7)	I_{DM}	-7.8	A
Continuous Source Current (Body Diode)		(Note 6)	I_S	-2.3	A
Pulsed Source Current (Body Diode)		(Note 7)	I_{SM}	-7.8	A

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

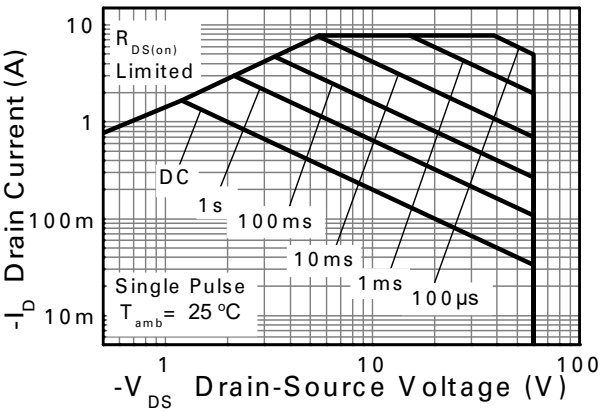
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	2.0	W
Linear Derating Factor			16	mW/°C
	(Note 6)		3.9	W
			31	mW/°C
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	62.5	°C/W
	(Note 6)		32.0	
Thermal Resistance, Junction to Lead	(Note 8)	$R_{\theta JL}$	9.8	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes:
5. 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.
6. Same as Note 5, except the device is measured at t ≤ 10 sec.
7. Same as Note 5, except the device is pulsed with D = 0.02 and pulse width 300µs. The pulse current is limited by the maximum junction temperature.
8. Thermal resistance from junction to solder-point (at the end of the drain lead).

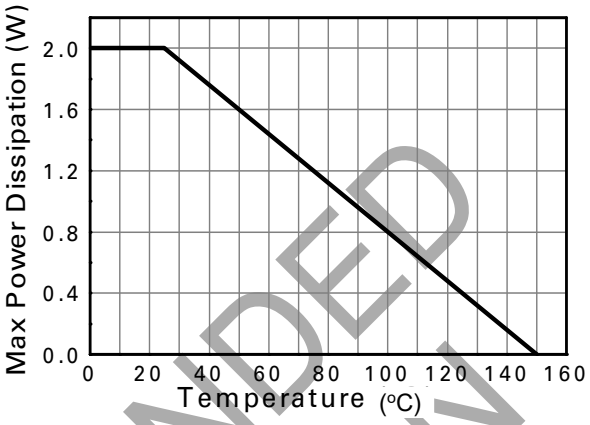
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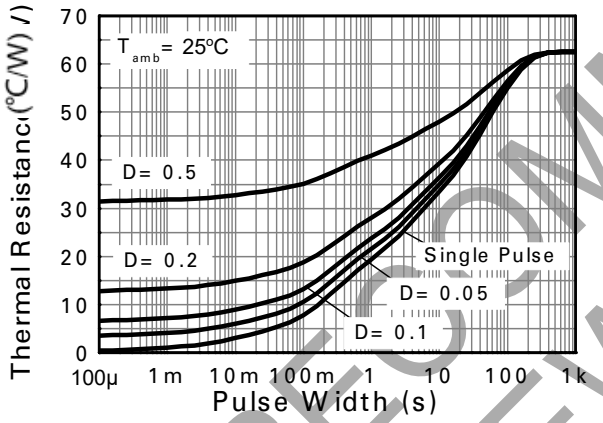
Thermal Characteristics



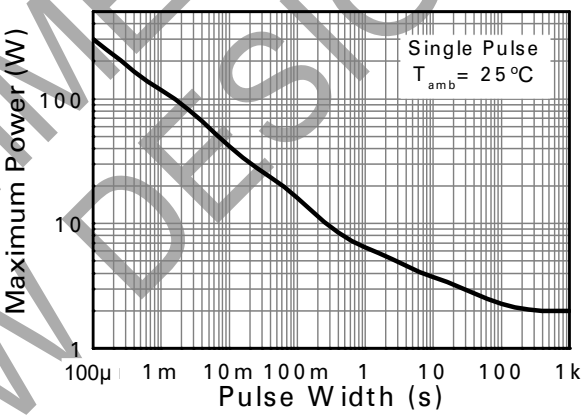
Safe Operating Area



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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

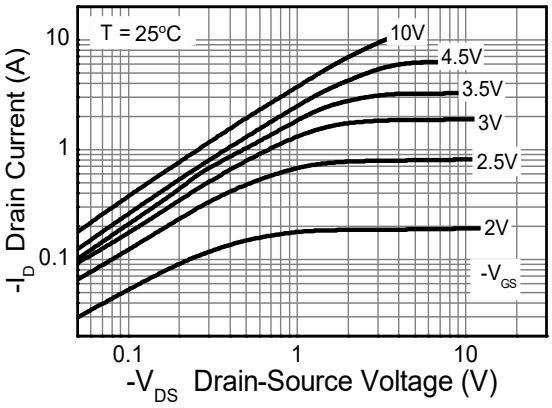
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	-60	—	—	V	I_D = -250µA, V_{GS} = 0
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-0.5	µA	V_{DS} = -60V, V_{GS} = 0
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0
ON 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 9)	$R_{DS(ON)}$	—	—	0.390	Ω	V_{GS} = -10V, I_D = -0.9A
				0.595		V_{GS} = -4.5V, I_D = -0.8A
Forward Transconductance (Notes 9 & 10)	g_{fs}	—	1.8	—	S	V_{DS} = -15V, I_D = -0.9A
Diode Forward Voltage (Note 9)	V_{SD}	—	-0.85	-0.95	V	I_S = -0.8A, V_{GS} = 0, T_J = +25°C
Reverse-Recovery Time (Note 10)	t_{RR}	—	21.1	—	ns	I_S = -0.9A, di/dt = 100A/µs,
Reverse-Recovery Charge (Note 10)	Q_{RR}	—	19.3	—	nC	T_J = +25°C
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	219	—	pF	V_{DS} = -30V, V_{GS} = 0 f = 1MHz
Output Capacitance	C_{oss}	—	25.7	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	20.5	—	pF	
Total Gate Charge (Note 11)	Q_g	—	2.9	—	nC	V_{GS} = -4.5V
Total Gate Charge (Note 11)	Q_g	—	5.9	—	nC	V_{DS} = -30V, I_D = -0.9A, V_{GS} = -10V
Gate-Source Charge (Note 11)	Q_{gs}	—	0.74	—	nC	
Gate-Drain Charge (Note 11)	Q_{gd}	—	1.5	—	nC	
Turn-On Delay Time (Note 11)	$t_{D(ON)}$	—	1.6	—	ns	V_{DD} = -30V, V_{GS} = -10V, I_D = -1A, $R_G \cong 6.0\Omega$
Turn-On Rise Time (Note 11)	t_R	—	2.2	—	ns	
Turn-Off Delay Time (Note 11)	$t_{D(OFF)}$	—	11.2	—	ns	
Turn-Off Fall Time (Note 11)	t_F	—	5.7	—	ns	

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

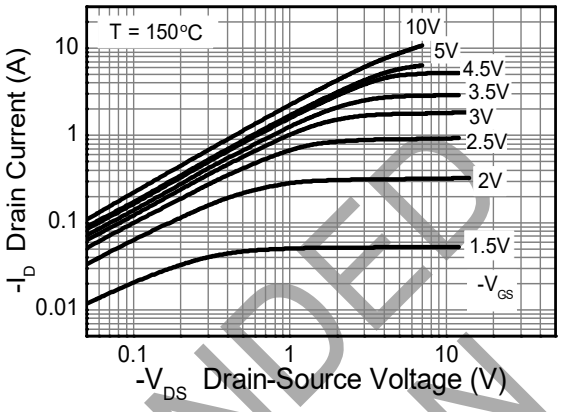
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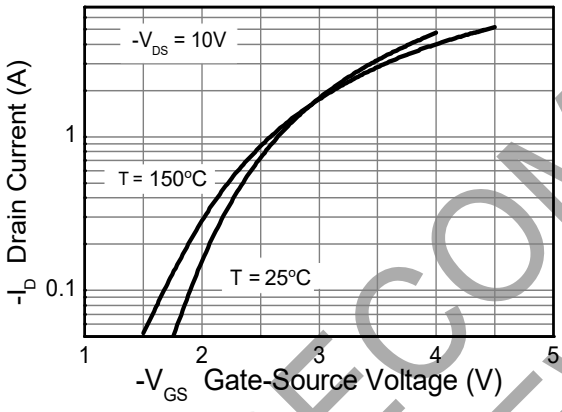
Typical Characteristics



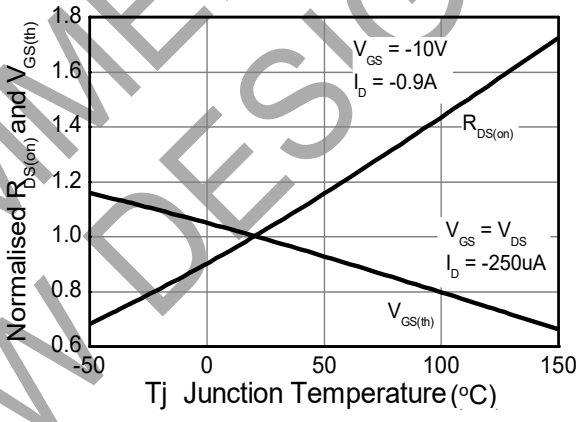
Output Characteristics



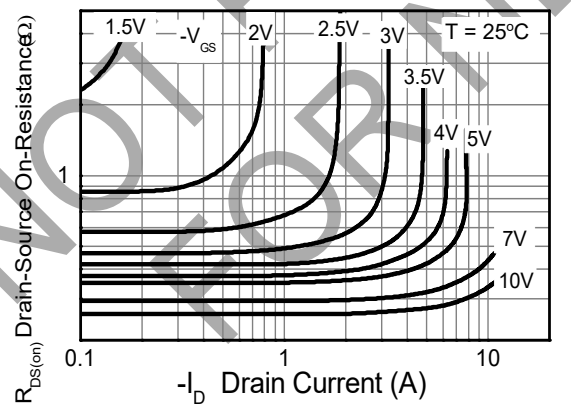
Output Characteristics



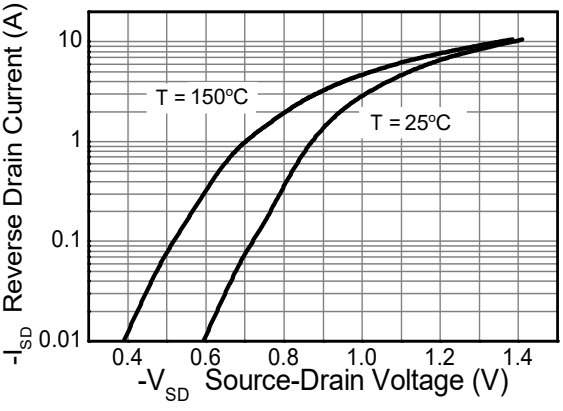
Typical Transfer Characteristics



Normalised Curves v Temperature



On-Resistance v Drain Current

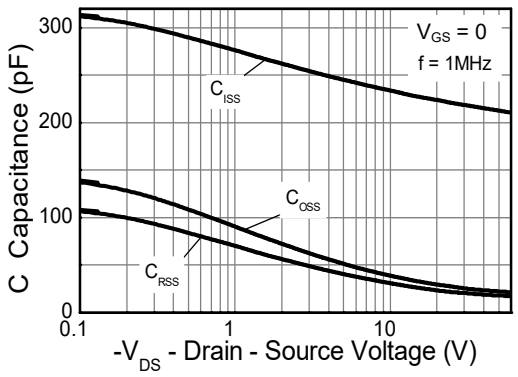


Source-Drain Diode Forward Voltage

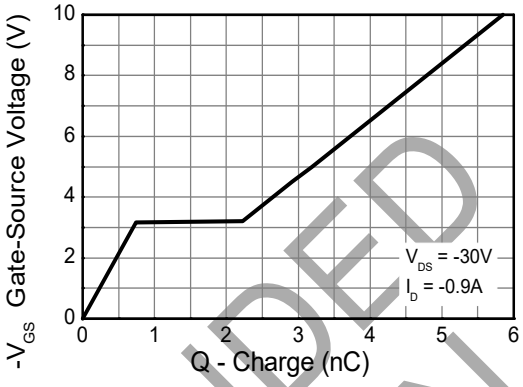
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Typical Characteristics (continued)



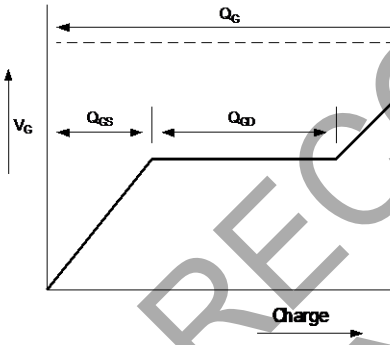
Capacitance v Drain-Source Voltage



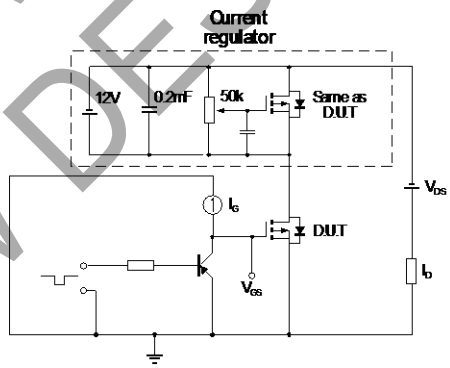
Gate-Source Voltage v Gate Charge

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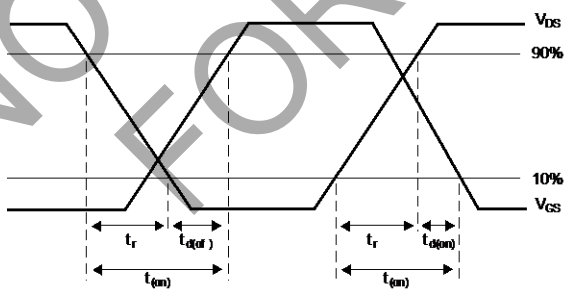
Test Circuits



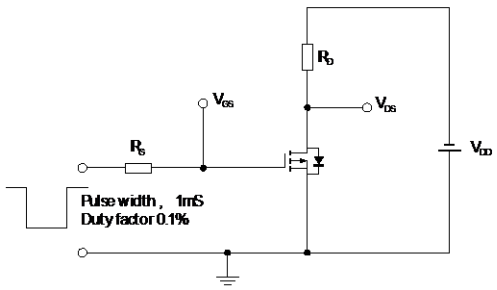
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms



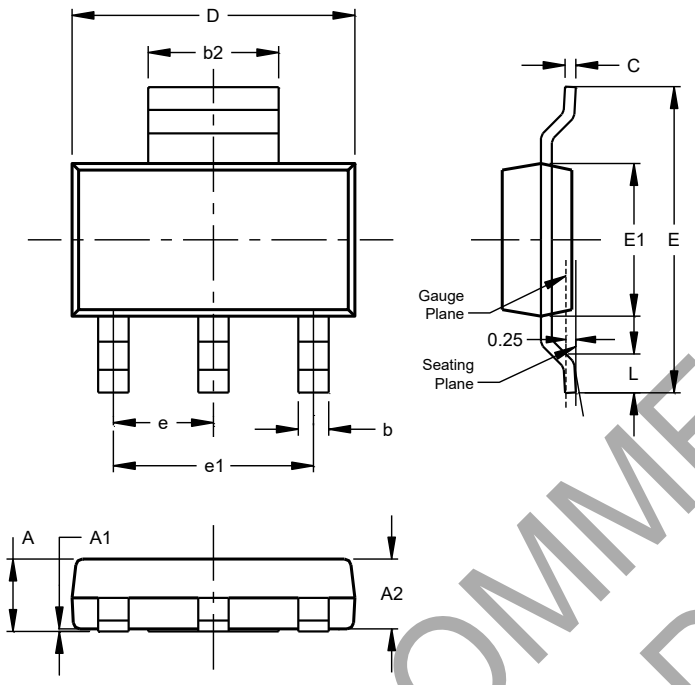
Switching time test circuit

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Package Outline Dimensions

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

SOT223 (Type DN)



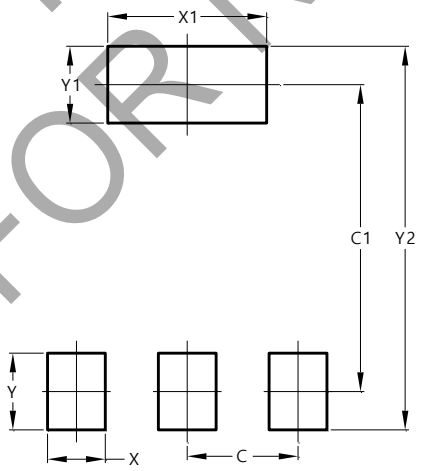
SOT223 (Type DN)			
Dim	**Min**	**Max**	**Typ**
A	--	1.70	--
A1	0.01	0.15	--
A2	1.50	1.68	1.60
b	0.60	0.80	0.70
b2	2.90	3.10	--
c	0.20	0.32	--
D	6.30	6.70	--
E	6.70	7.30	--
E1	3.30	3.70	--
e	--	--	2.30
e1	--	--	4.60
L	0.85	--	--
All Dimensions in mm			

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Suggested Pad Layout

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

SOT223 (Type DN)



Dimensions	Value (in mm)
C	2.30
C1	6.40
X	1.20
X1	3.30
Y	1.60
Y1	1.60
Y2	8.00

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