100V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
-100V	1.0Ω @ V_{GS} = -10V	-0.7A
	1.45Ω @ V_{GS} = -6.0V	-0.5A

Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

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

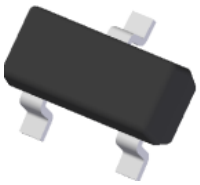
Features and Benefits

- Fast Switching Speed
- Low Input Capacitance
- Low Gate Charge
- Low Threshold
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The ZXMP10A13FQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

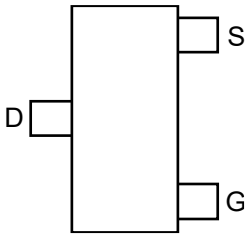
Mechanical Data

- Package: SOT23
- Package Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.009 grams (Approximate)

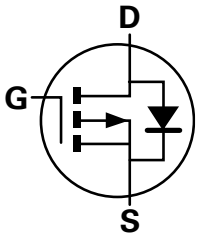
SOT23 (Type DN)



Top View



Top View
Pin Out



Equivalent Circuit

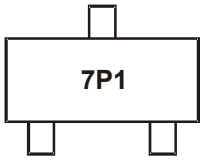
Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
ZXMP10A13FQTA	SOT23 (Type DN)	3000	Tape & Reel
ZXMP10A13FQTC	SOT23 (Type DN)	10000	Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
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

SOT23 (Type DN)



7P1 = Product Type Marking Code

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

Characteristic				Symbol	Value	Unit
Drain-Source Voltage				V_{DSS}	-100	V
Gate-Source Voltage				V_{GS}	±20	V
Continuous Drain Current	V_{GS} = -10V	T_A = +70°C	(Note 6) (Note 6) (Note 6)	I_D	-0.7 -0.5 -0.6	A
Pulsed Drain Current (Note 7)				I_{DM}	-3.1	A
Continuous Source Current (Body Diode) (Note 5)				I_S	-1.1	A
Pulsed Source Current (Body Diode) (Note 7)				I_{SM}	-3.1	A

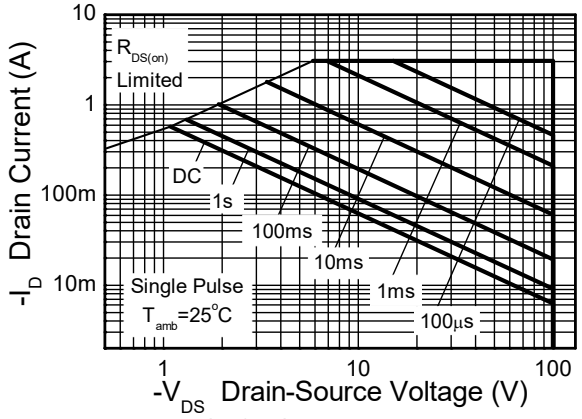
Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5) Linear Derating Factor	P_D	625 5	mW mW/°C
Power Dissipation (Note 6) Linear Derating Factor	P_D	806 6.4	mW mW/°C
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	200	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	155	°C/W
Thermal Resistance, Junction to Leads (Note 8)	$R_{\theta JL}$	194	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

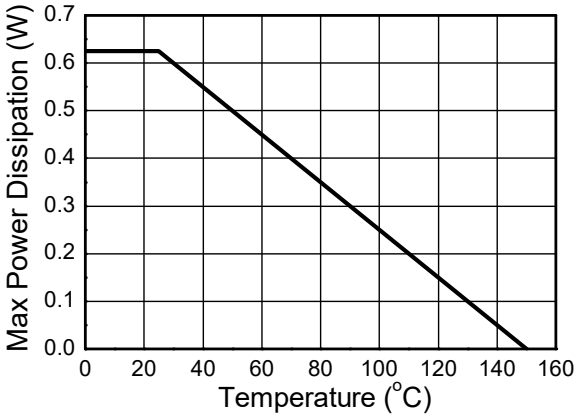
Notes:
5. For a device surface mounted on 25mm x 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
6. For a device surface mounted on FR-4 PCB measured at t ≤ 5 secs.
7. Repetitive rating 25mm x 25mm FR-4 PCB, D = 0.05 pulse width = 10µs - pulse current limited by maximum junction temperature.
8. Thermal resistance from junction to solder-point (at the end of the drain lead).

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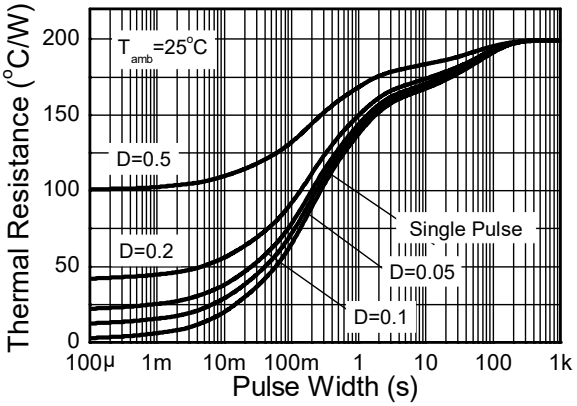
Thermal Characteristics



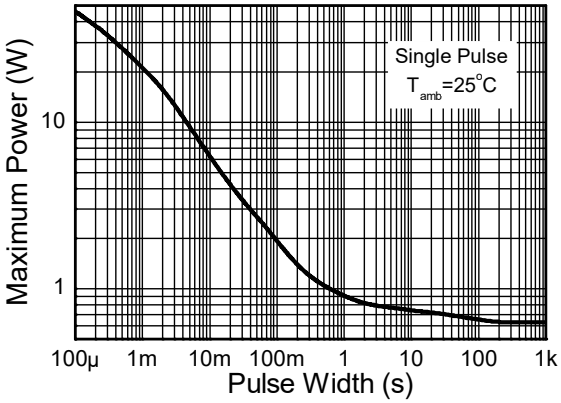
Safe Operating Area



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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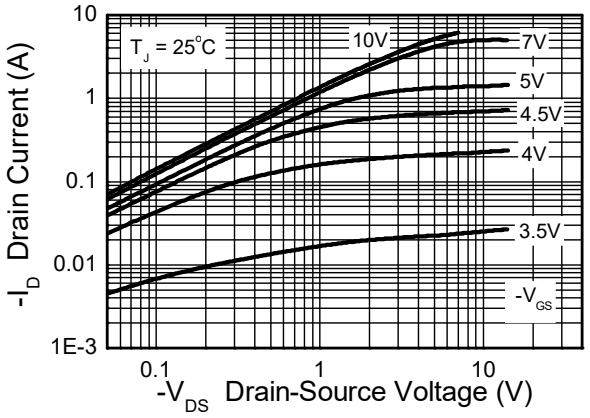
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	-100	—	—	V	I_D = -250µA, V_{GS} = 0
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1.0	µA	V_{DS} = -100V, V_{GS} = 0
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	-2.0	—	-4.0	V	I_D = -250µA, V_{DS} = V_{GS}
Static Drain-Source On-Resistance (Note 9)	$R_{DS(ON)}$	—	—	1.0	Ω	V_{GS} = -10V, I_D = -0.6A
				1.45		V_{GS} = -6.0V, I_D = -0.5A
Forward Transconductance (Notes 9 and 11)	g_{fs}	—	1.2	—	S	V_{DS} = -15V, I_D = -0.6A
Diode Forward Voltage (Note 9)	V_{SD}	—	-0.85	-0.95	V	T_J = +25°C, I_S = -0.75A, V_{GS} = 0
Reverse-Recovery Time (Note 11)	t_{RR}	—	29	—	ns	T_J = +25°C, I_F = -0.9A, di/dt = 100A/µs
Reverse-Recovery Charge (Note 11)	Q_{RR}	—	31	—	nC	
DYNAMIC CHARACTERISTICS (Note 11)						
Input Capacitance	C_{iss}	—	141	—	pF	V_{DS} = -50V, V_{GS} = 0 f = 1.0MHz
Output Capacitance	C_{oss}	—	13.1	—		
Reverse Transfer Capacitance	C_{rss}	—	10.8	—		
Turn-On Delay Time (Note 10)	$t_{D(ON)}$	—	1.6	—	ns	V_{DD} = -50V, I_D = -1.0A, R_G ≈ 6.0Ω, V_{GS} = -10V
Turn-On Rise Time (Note 10)	t_R	—	2.1	—		
Turn-Off Delay Time (Note 10)	$t_{D(OFF)}$	—	5.9	—		
Turn-Off Fall Time (Note 10)	t_F	—	3.3	—		
Total Gate Charge (Note 10)	Q_g	—	1.8	—	nC	V_{DS} = -50V, V_{GS} = -5.0V, I_D = -0.6A
Total Gate Charge (Note 10)	Q_g	—	3.5	—	nC	V_{DS} = -50V, V_{GS} = -10V, I_D = -0.6A
Gate-Source Charge (Note 10)	Q_{gs}	—	0.6	—		
Gate-Drain Charge (Note 10)	Q_{gd}	—	1.6	—		

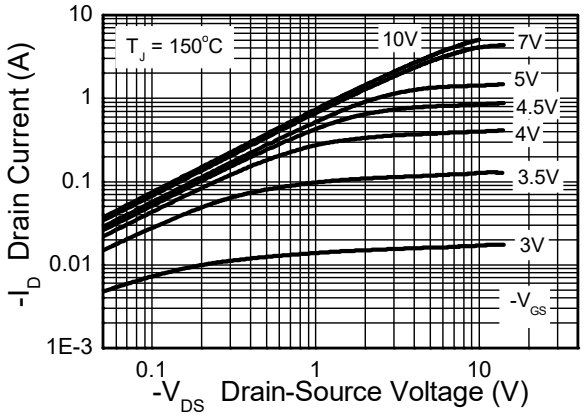
Notes: 9. Measured under pulsed conditions. Pulse width = 300µs. Duty cycle ≤ 2%.
10. Switching characteristics are independent of operating junction temperature.
11. For design aid only, not subject to production testing.

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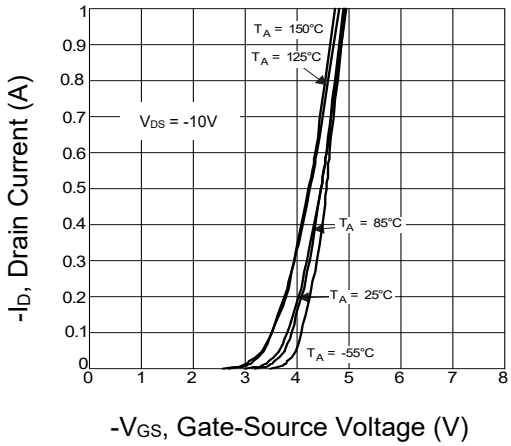
Typical Characteristics



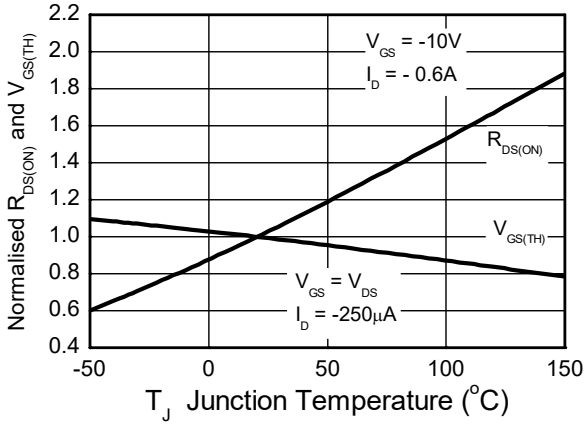
Output Characteristics



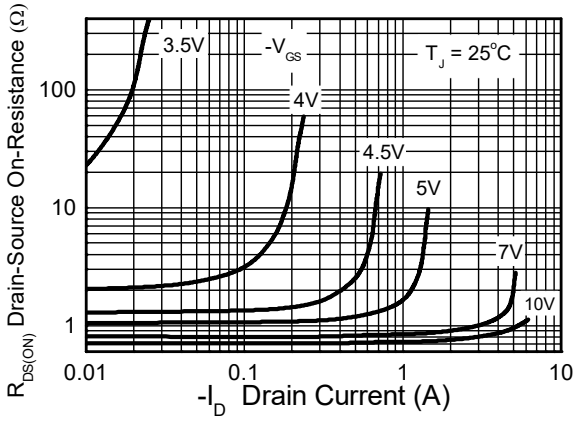
Output Characteristics



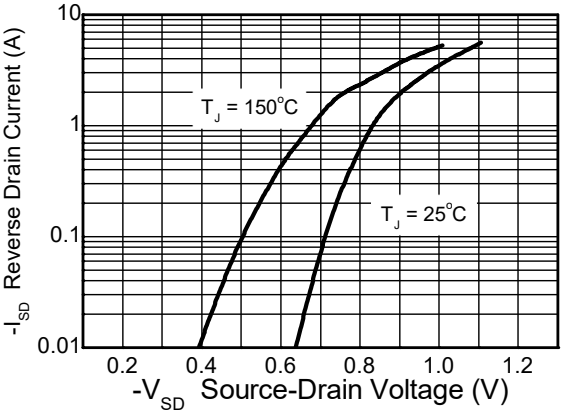
Typical Transfer Characteristics



Normalised Curves v Temperature



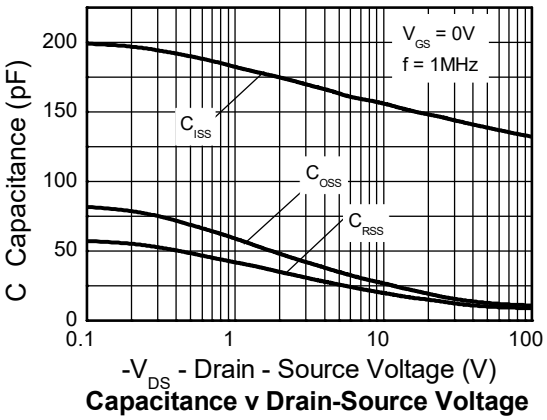
On-Resistance v Drain Current



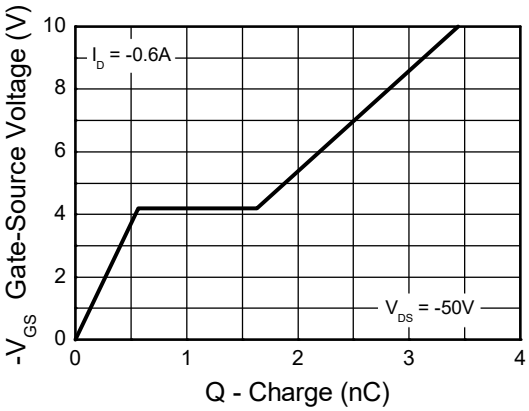
Source-Drain Diode Forward Voltage

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Typical Characteristics (continued)

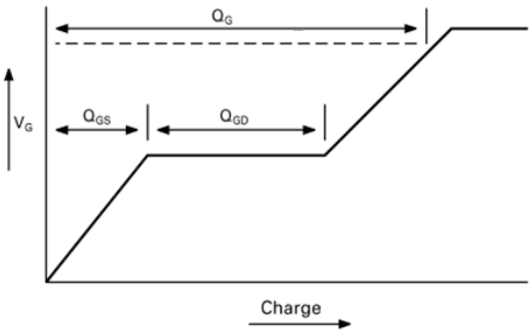


Capacitance v Drain-Source Voltage

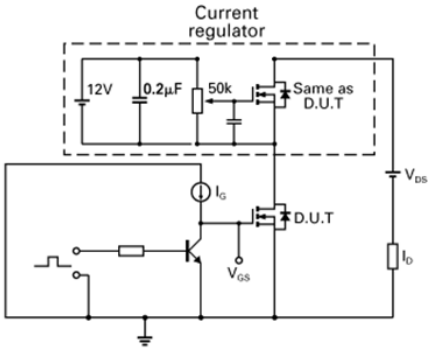


Gate-Source Voltage v Gate Charge

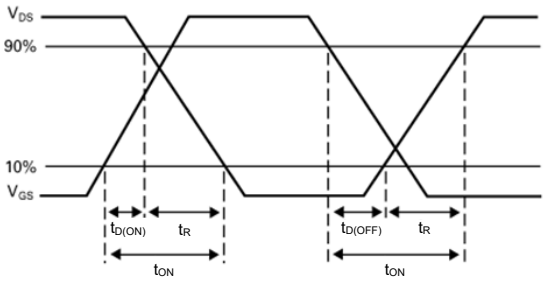
Test Circuits



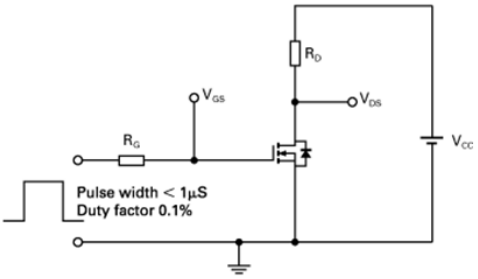
Basic Gate Charge Waveform



Gate Charge Test Circuit



Switching Time Waveforms



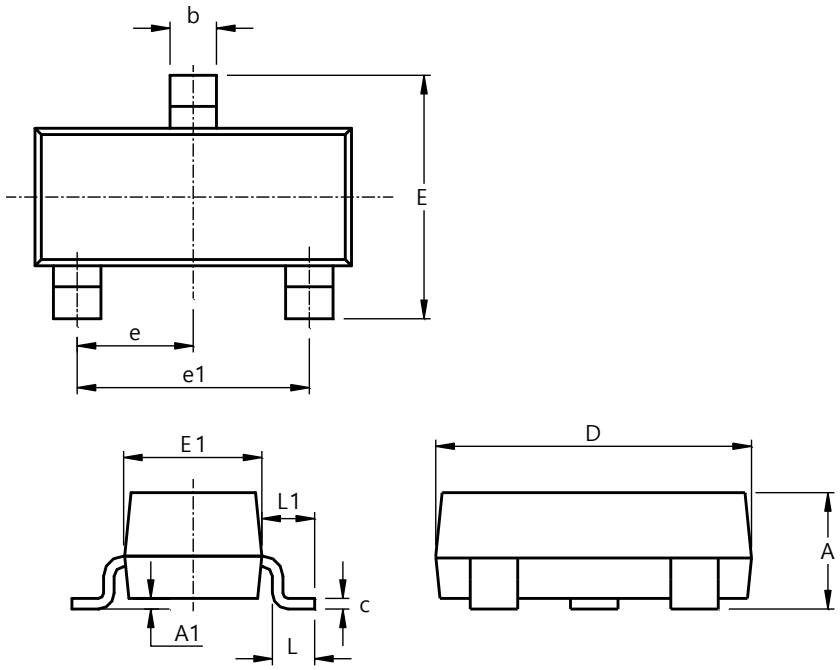
Switching Time Test Circuit

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Package Outline Dimensions

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

SOT23 (Type DN)

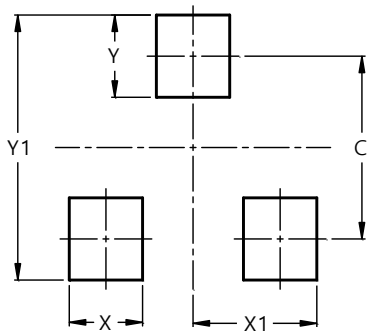


SOT23 Type DN			
Dim	**Min**	**Max**	**Typ**
A	0.89	1.12	1.00
A1	0.01	0.10	0.05
b	0.30	0.51	0.45
c	0.08	0.20	0.10
D	2.80	3.04	3.00
E	2.10	2.64	2.42
E1	1.20	1.40	1.37
e	0.95 REF		
e1	1.90 REF		
L	0.25	0.60	0.30
L1	0.45	0.62	0.54
All Dimensions in mm			

Suggested Pad Layout

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

SOT23 (Type DN)



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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