

60V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D $T_A = 25^\circ C$
-60V	400m Ω @ $V_{GS} = -10V$	400m Ω = -1.1A
	600m Ω @ $V_{GS} = -4.5V$	600m Ω = -0.9A

Description and Applications

This MOSFET utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed, making it ideal for high-efficiency power management applications.

- DC - DC converters
- Power management functions
- Relay and solenoid driving
- Motor control

Features and Benefits

- Fast switching speed
- Low input capacitance
- Low gate charge
- **Qualified to AEC-Q101 Standards for High Reliability**

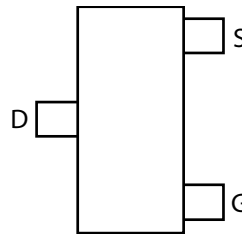
Mechanical Data

- Case: SOT-23
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Copper leadframe Solderable per MIL-STD-202, Method 208
- Weight: 0.008 grams (approximate)

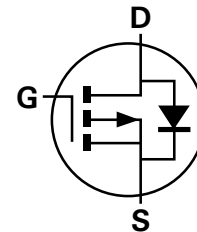
SOT-23



Top View



Top View
Pin Out

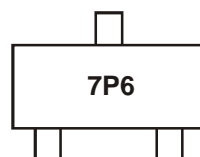


Equivalent Circuit

Ordering Information

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMP6A13FTA	7P6	7	8	3000 Units

Marking Information



7P6 = Product Type Marking Code

Maximum Ratings @T_A = 25°C unless otherwise specified

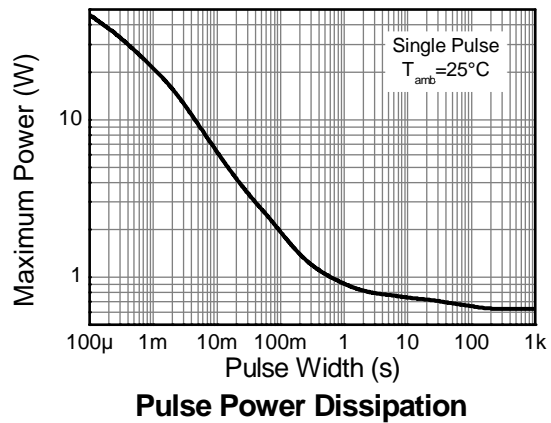
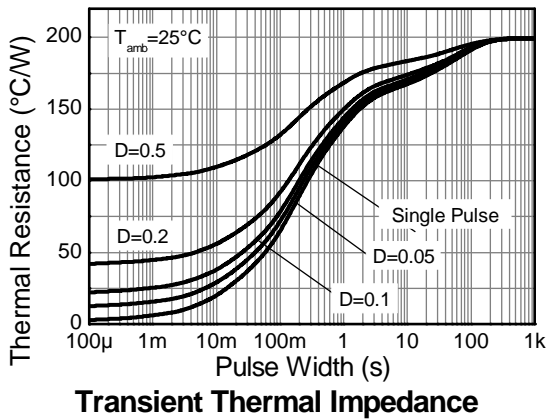
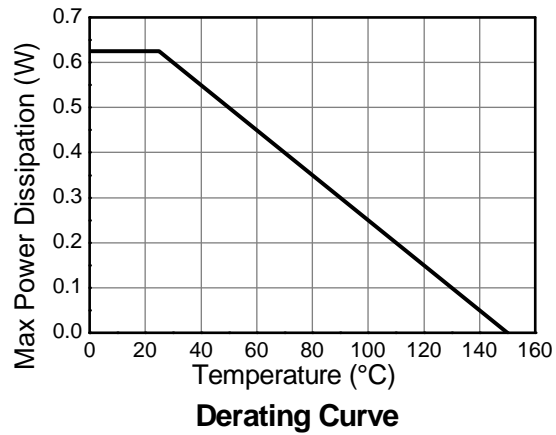
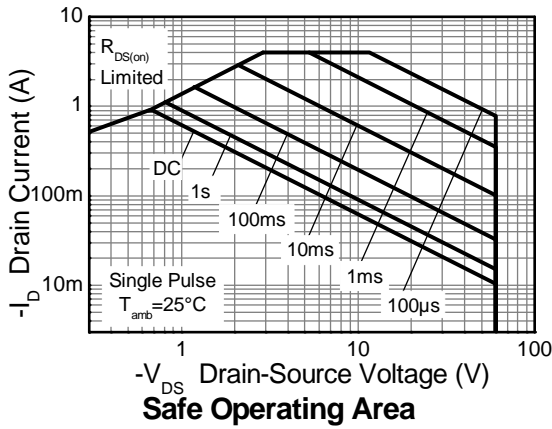
Characteristic			Symbol	Value	Units
Drain-Source Voltage			V _{DSS}	-60	V
Gate-Source Voltage			V _{GS}	±20	V
Continuous Drain Current	V _{GS} = 10V	(Note 2)	I _D	-1.1	A
		T _A = 70°C (Note 2) (Note 1)		-0.8 -0.9	
Pulsed Drain Current (Note 3)			I _{DM}	-4.0	A
Continuous Source Current (Body Diode) (Note 2)			I _S	-1.2	A
Pulsed Source Current (Body Diode) (Note 3)			I _{SM}	-4.0	A

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Power Dissipation (Note 1)		P _D	625	mW
Linear Derating Factor			5	mW/°C
Power Dissipation (Note 2)		P _D	806	mW
Linear Derating Factor			6.5	mW/°C
Thermal Resistance, Junction to Ambient (Note 1)		R _{θJA}	200	°C/W
Thermal Resistance, Junction to Ambient (Note 2)		R _{θJA}	155	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

- Notes:
1. For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions
 2. For a device surface mounted on FR4 PCB measured at t ≤ 5 secs.
 3. Repetitive rating 25mm x 25mm FR4 PCB, D=0.05 pulse width=10µs - pulse current limited by maximum junction temperature.

Thermal Characteristics

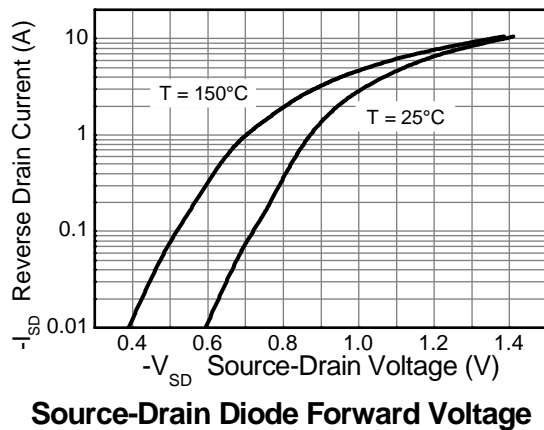
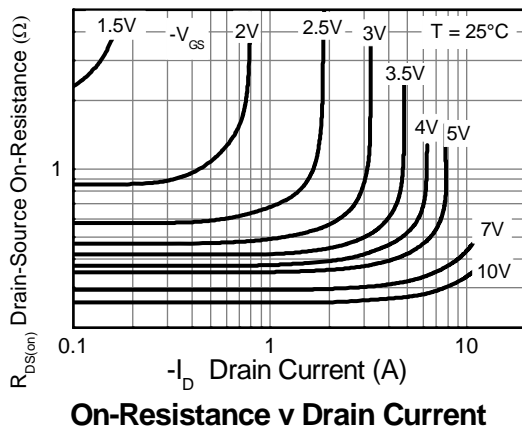
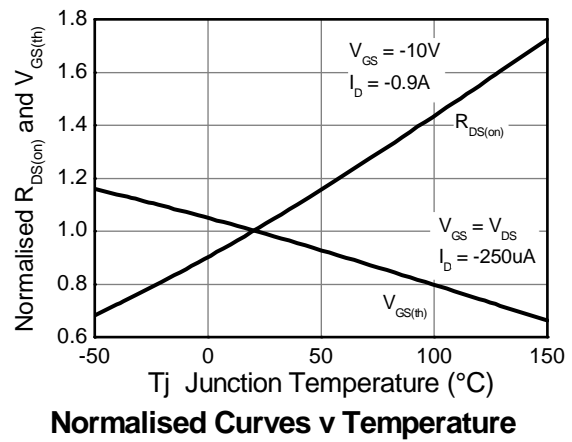
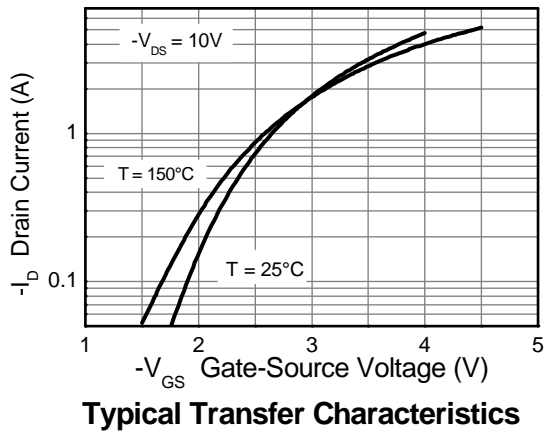
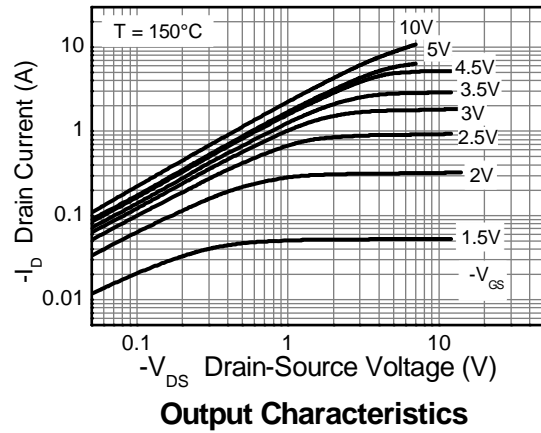
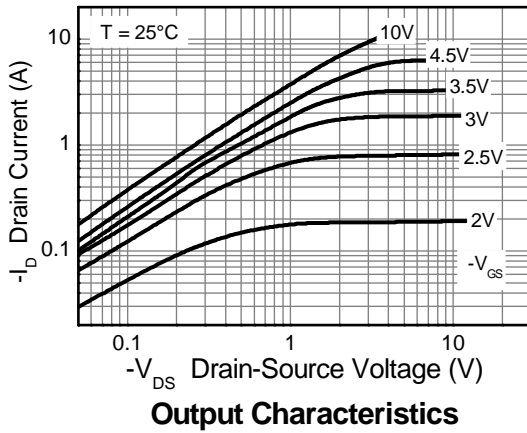


Electrical Characteristics @T_A = 25°C unless otherwise specified

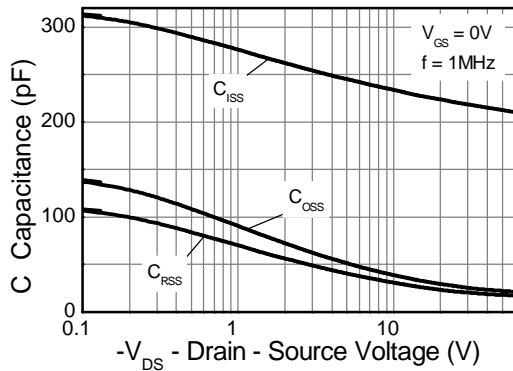
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	-60	—	—	V	I _D = -250μA, V _{GS} = 0V
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-0.5	μA	V _{DS} = -60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 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 4)	R _{DS(on)}	—	—	0.400	Ω	V _{GS} = -10V, I _D = -0.9A
				0.600		V _{GS} = -4.5V, I _D = -0.8A
Forward Transconductance (Notes 4 and 6)	g _{fs}	—	1.8	—	S	V _{DS} = -15V, I _D = -0.9A
Diode Forward Voltage (Note 4)	V _{SD}	—	-0.85	-0.95	V	T _J = 25°C, I _S = -0.8A, V _{GS} = 0V
Reverse Recovery Time (Note 6)	t _{rr}	—	21.1	—	ns	T _J = 25°C, I _F = -0.9A,
Reverse Recovery Charge (Note 6)	Q _{rr}	—	19.3	—	nC	di/dt = 100A/μs
DYNAMIC CHARACTERISTICS (Note 6)						
Input Capacitance	C _{iss}	—	219	—	pF	V _{DS} = -30V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	25.7	—		
Reverse Transfer Capacitance	C _{rss}	—	20.5	—		
Turn-On Delay Time (Note 5)	t _{D(on)}	—	1.6	—	ns	V _{DD} = -30V, I _D = -1A, R _G ≅ 6.0Ω, V _{GS} = -10V
Turn-On Rise Time (Note 5)	t _r	—	2.2	—		
Turn-Off Delay Time (Note 5)	t _{D(off)}	—	11.2	—		
Turn-Off Fall Time (Note 5)	t _f	—	5.7	—		
Total Gate Charge (Note 5)	Q _g	—	2.9	—	nC	V _{DS} = -30V, V _{GS} = -4.5V, I _D = -0.9A
Total Gate Charge (Note 5)	Q _g	—	5.9	—	nC	V _{DS} = -30V, V _{GS} = -10V, I _D = -0.9A
Gate-Source Charge (Note 5)	Q _{gs}	—	0.74	—		
Gate-Drain Charge (Note 5)	Q _{gd}	—	1.5	—		

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

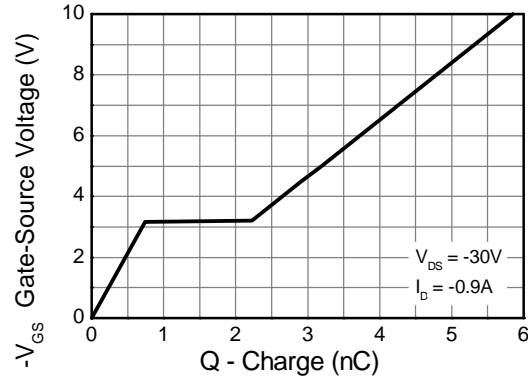
Typical Characteristics



Typical Characteristics - continued

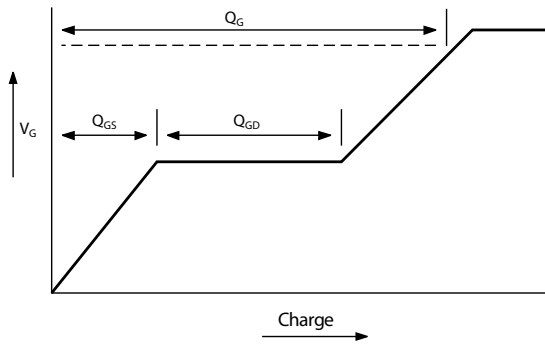


Capacitance v Drain-Source Voltage

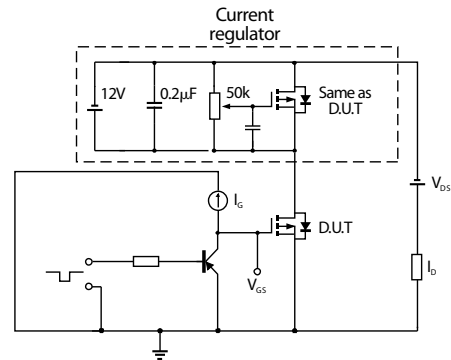


Gate-Source Voltage v Gate Charge

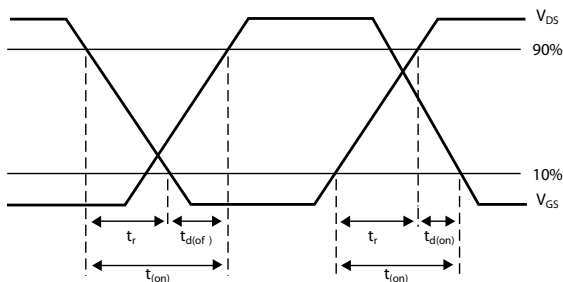
Test Circuits



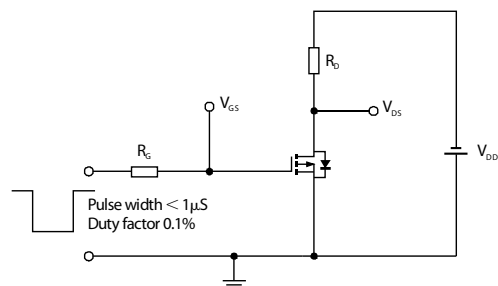
Basic gate charge waveform



Gate charge test circuit

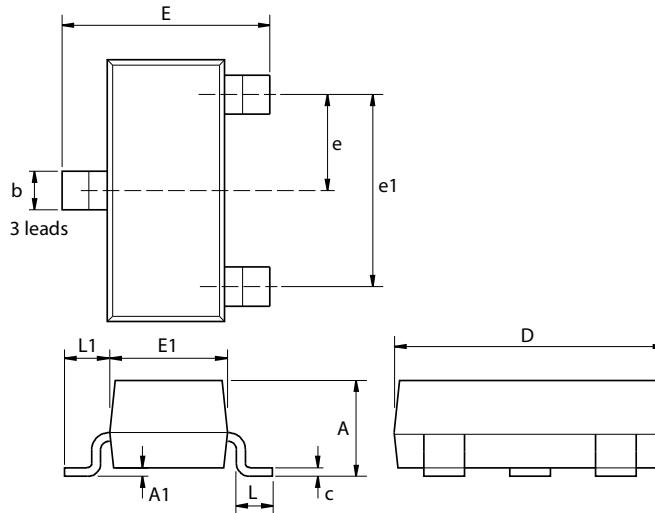


Switching time waveforms



Switching time test circuit

Package Outline Dimensions

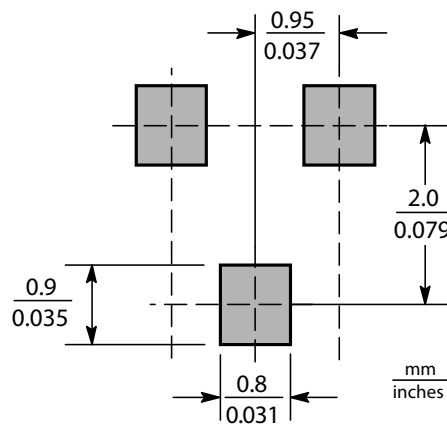


SOT23

Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	-	1.12	-	0.044	e1	1.90 NOM		0.075 NOM	
A1	0.01	0.10	0.0004	0.004	E	2.10	2.64	0.083	0.104
b	0.30	0.50	0.012	0.020	E1	1.20	1.40	0.047	0.055
c	0.085	0.20	0.003	0.008	L	0.25	0.60	0.0098	0.0236
D	2.80	3.04	0.110	0.120	L1	0.45	0.62	0.018	0.024
e	0.95 NOM		0.037 NOM		-	-	-	-	-

Note: Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

Suggested Pad Layout



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