

60V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

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

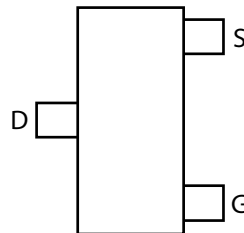
- Fast switching speed
- Low input capacitance
- Low gate charge
- "Lead Free", RoHS Compliant (Note 1)
- Halogen and Antimony Free. "Green" Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

Mechanical Data

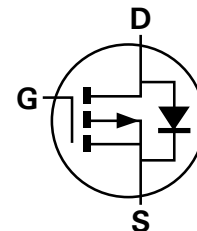
- Case: SOT23
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Copper leadframe Solderable per MIL-STD-202, Method 208
- Weight: 0.008 grams (approximate)

SOT23

Top View



Top View
Pin Out



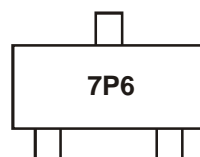
Equivalent Circuit

Ordering Information (Note 3)

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

- 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



7P6 = Product Type Marking Code

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

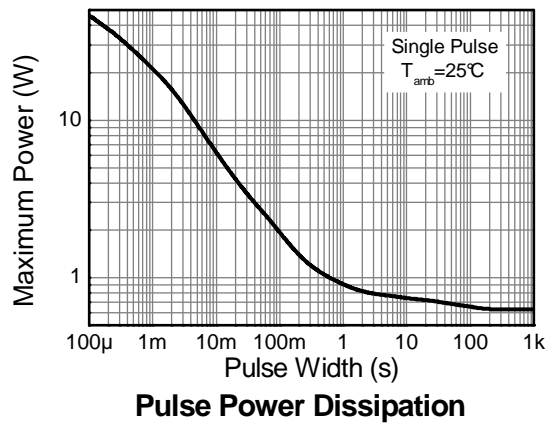
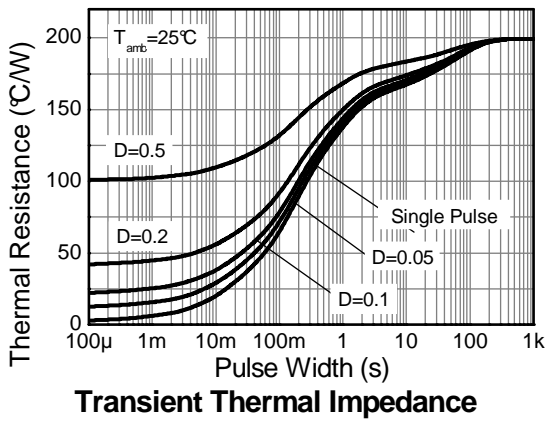
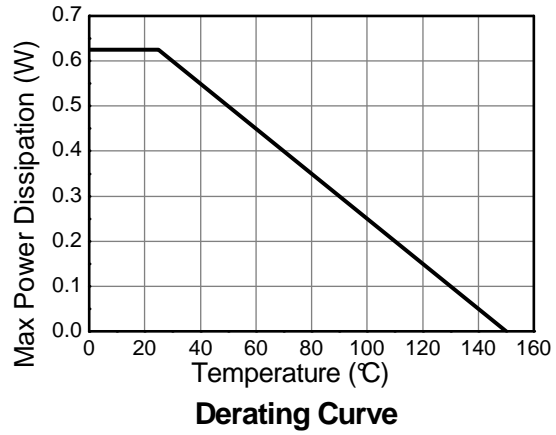
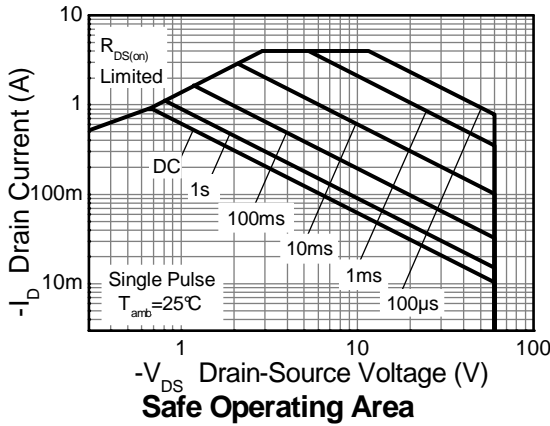
Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-60	V
Gate-Source Voltage			V_{GS}	± 20	V
Continuous Drain Current	$V_{GS} = 10\text{V}$	(Note 5)	I_D	-1.1	A
		$T_A = 70^\circ\text{C}$ (Note 5)		-0.8	
		(Note 4)		-0.9	
Pulsed Drain Current (Note 6)			I_{DM}	-4.0	A
Continuous Source Current (Body Diode) (Note 5)			I_S	-1.2	A
Pulsed Source Current (Body Diode) (Note 6)			I_{SM}	-4.0	A

Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic		Symbol	Value	Unit
Power Dissipation (Note 4)		P_D	625	mW
Linear Derating Factor			5	mW/ $^\circ\text{C}$
Power Dissipation (Note 5)		P_D	806	mW
Linear Derating Factor			6.5	mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient (Note 4)		$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient (Note 5)		$R_{\theta JA}$	155	$^\circ\text{C}/\text{W}$
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 FR4 PCB with high coverage of single sided 1oz copper, in still air conditions
 5. For a device surface mounted on FR4 PCB measured at $t \leq 5$ secs.
 6. Repetitive rating 25mm x 25mm FR4 PCB, $D = 0.05$ pulse width = 10 μs - pulse current limited by maximum junction temperature.

Thermal Characteristics

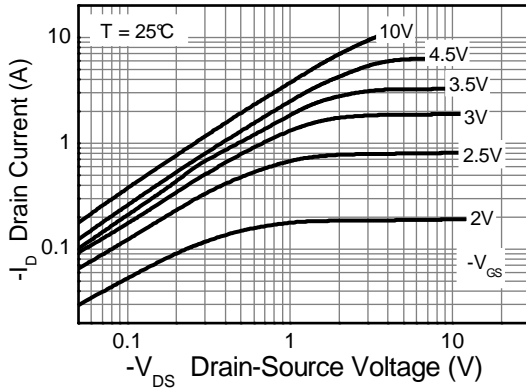


Electrical Characteristics @T_A = 25°C unless otherwise specified

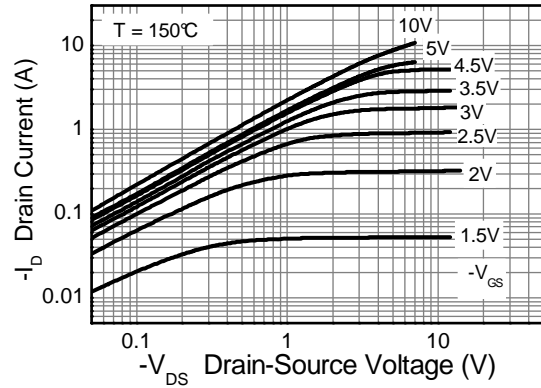
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	-60	—	—	V	I _D = -250μA, V _{GS} = 0V
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-0.5	μA	V _{DS} = -60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(th)}	-1.0	—	-3.0	V	I _D = -250μA, V _{DS} = V _{GS}
Static Drain-Source On-Resistance (Note 7)	R _{DS(on)}	—	—	0.400	Ω	V _{GS} = -10V, I _D = -0.9A V _{GS} = -4.5V, I _D = -0.8A
				0.600		
Forward Transconductance (Notes 7 and 9)	g _{fs}	—	1.8	—	S	V _{DS} = -15V, I _D = -0.9A
Diode Forward Voltage (Note 7)	V _{SD}	—	-0.85	-0.95	V	T _J = 25°C, I _S = -0.8A, V _{GS} = 0V
Reverse Recovery Time (Note 9)	t _{rr}	—	21.1	—	ns	T _J = 25°C, I _F = -0.9A,
Reverse Recovery Charge (Note 9)	Q _{rr}	—	19.3	—	nC	di/dt = 100A/μs
DYNAMIC CHARACTERISTICS (Note 9)						
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 8)	t _{D(on)}	—	1.6	—	ns	V _{DD} = -30V, I _D = -1A, R _G ≅ 6.0Ω, V _{GS} = -10V
Turn-On Rise Time (Note 8)	t _r	—	2.2	—		
Turn-Off Delay Time (Note 8)	t _{D(off)}	—	11.2	—		
Turn-Off Fall Time (Note 8)	t _f	—	5.7	—		
Total Gate Charge (Note 8)	Q _g	—	2.9	—	nC	V _{DS} = -30V, V _{GS} = -4.5V, I _D = -0.9A
Total Gate Charge (Note 8)	Q _g	—	5.9	—	nC	V _{DS} = -30V, V _{GS} = -10V, I _D = -0.9A
Gate-Source Charge (Note 8)	Q _{gs}	—	0.74	—		
Gate-Drain Charge (Note 8)	Q _{gd}	—	1.5	—		

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

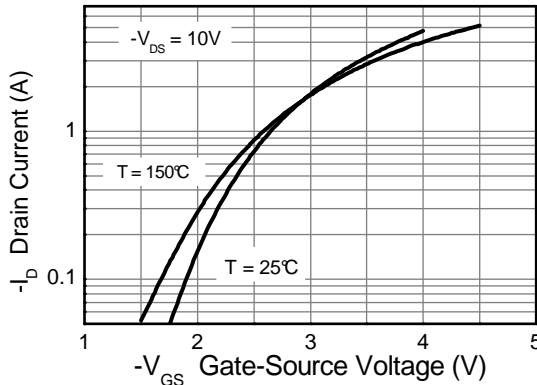
Typical Characteristics



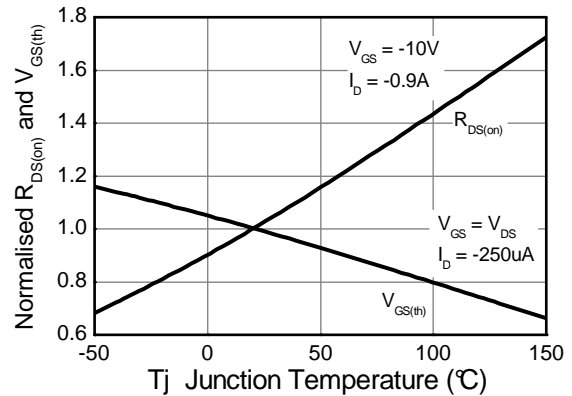
Output Characteristics



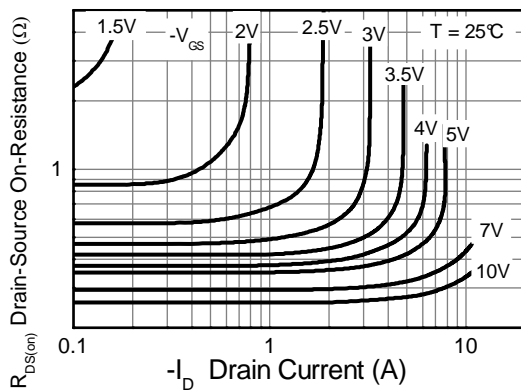
Output Characteristics



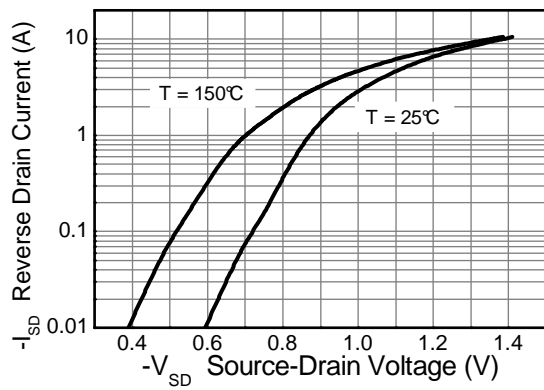
Typical Transfer Characteristics



Normalised Curves v Temperature

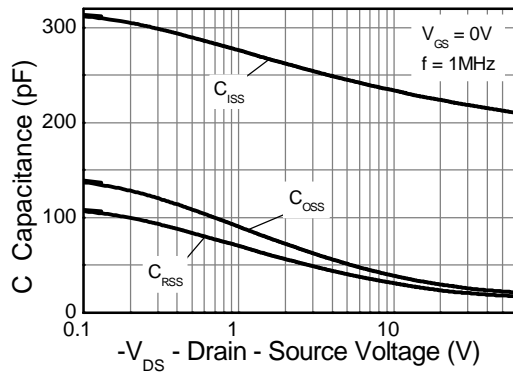


On-Resistance v Drain Current

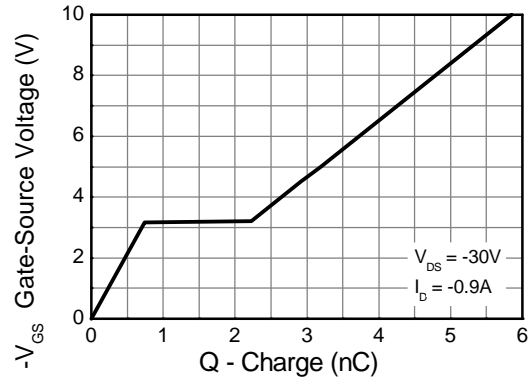


Source-Drain Diode Forward Voltage

Typical Characteristics - continued

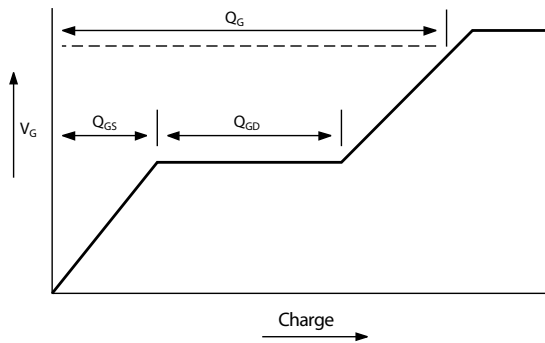


Capacitance v Drain-Source Voltage

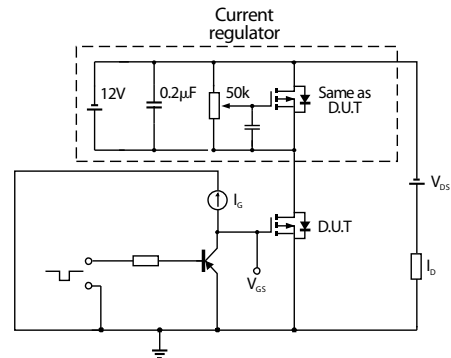


Gate-Source Voltage v Gate Charge

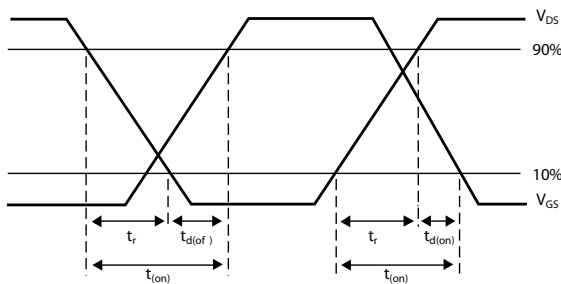
Test Circuits



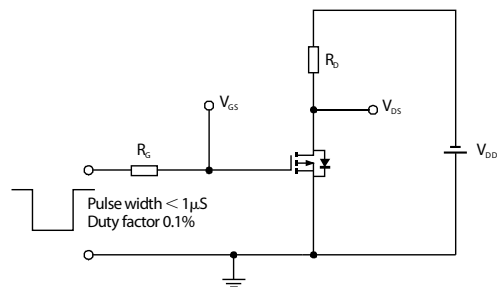
Basic gate charge waveform



Gate charge test circuit

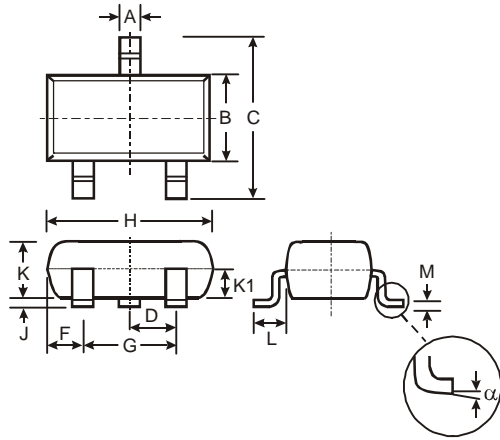


Switching time waveforms



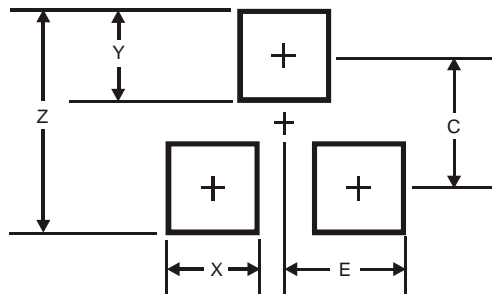
Switching time test circuit

Package Outline Dimensions



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	8°	-
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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