

60V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	Max $R_{DS(on)}$	Max I_D $T_A = 25^\circ C$ (Note 7)
60V	250m Ω @ $V_{GS} = 10V$	1.4A
	350m Ω @ $V_{GS} = 4.5V$	1.2A

Description

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.

Applications

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

Features

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate charge
- **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)**

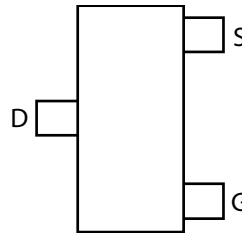
Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound,
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish (Sn)
- Weight: 0.008 grams (approximate)

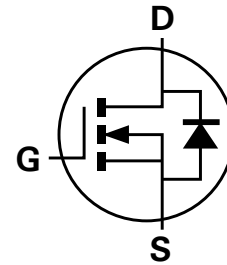
SOT23



Top View



Top View
Pin Out



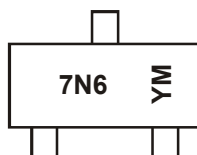
Equivalent Circuit

Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN6A07FTA	AEC-Q101	7N6	7	8	3000
ZXMN6A07FQTA	Automotive	7N6	7	8	3000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See <http://www.diodes.com> 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.
 5. For packaging details, go to our website at <http://www.diodes.com>.

Marking Information



7N6 = Product Type Marking Code

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

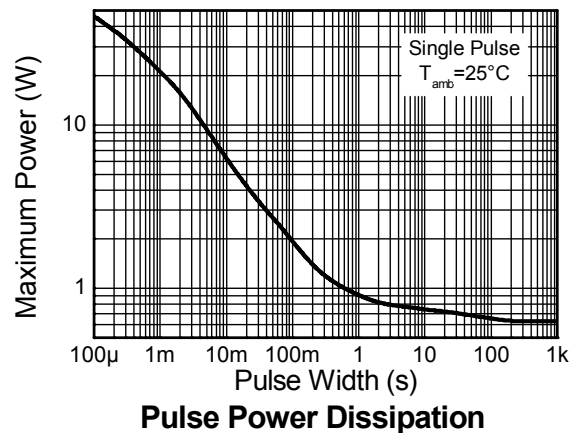
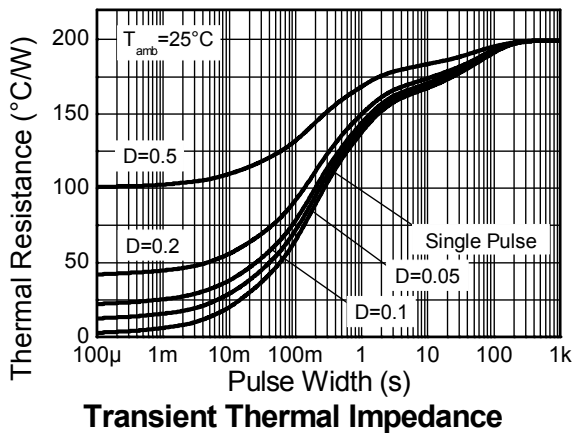
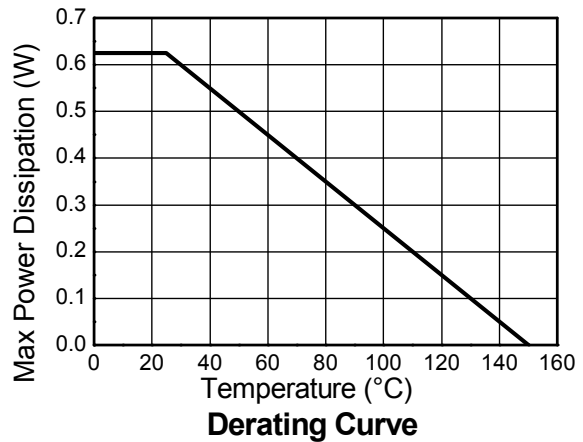
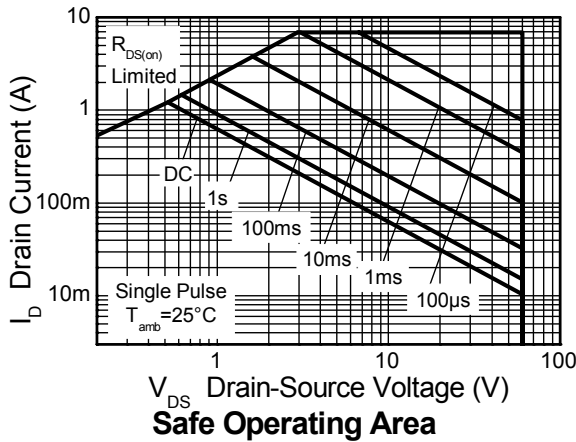
Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GS}	± 20	V
Continuous Drain Current	$V_{GS} = 10\text{V}$	$T_A = +25^\circ\text{C}$ (Note 7)	I_D	1.4	A
		$T_A = +70^\circ\text{C}$ (Note 7)		1.1	
		$T_A = +25^\circ\text{C}$ (Note 6)		1.2	
Pulsed Drain Current (Note 8)			I_{DM}	6.9	A
Continuous Source Current (Body Diode) (Note 7)			I_S	1	A
Pulsed Source Current (Body Diode) (Note 8)			I_{SM}	6.9	A

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Power Dissipation (Note 6)			P_D	625	mW
Linear Derating Factor				5	$\text{mW}/^\circ\text{C}$
Power Dissipation (Note 7)			P_D	806	mW
Linear Derating Factor				6.4	$\text{mW}/^\circ\text{C}$
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$	
	(Note 7)		155		
Thermal Resistance, Junction to Ambient (Note 9)			$R_{\theta JL}$		194
Operating and Storage Temperature Range			T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes:
6. For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions
 7. For a device surface mounted on FR4 PCB measured at $t \leq 5$ secs.
 8. Repetitive rating 25mm x 25mm FR4 PCB, $D=0.02$ pulse width=300 μs - pulse current limited by maximum junction temperature
 9. Thermal resistance from junction to solder-point (at the end of the drain lead).

Thermal Characteristics

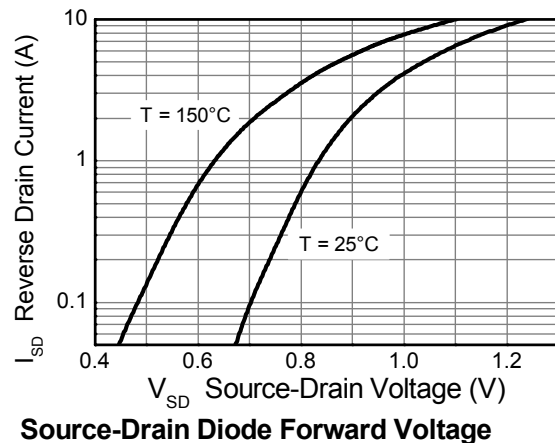
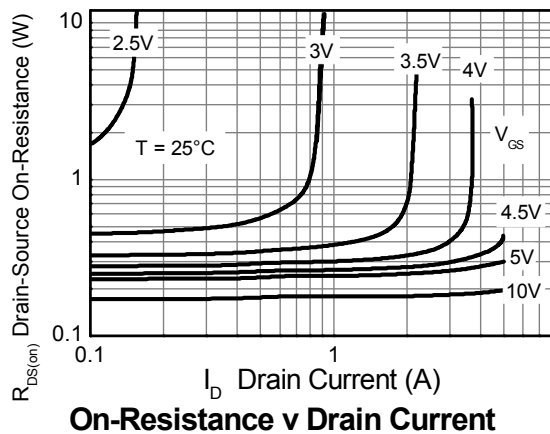
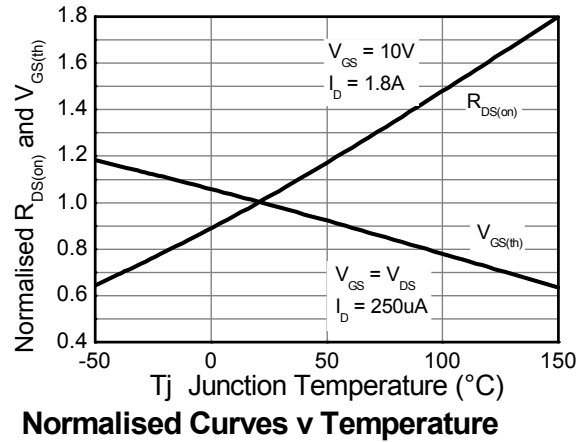
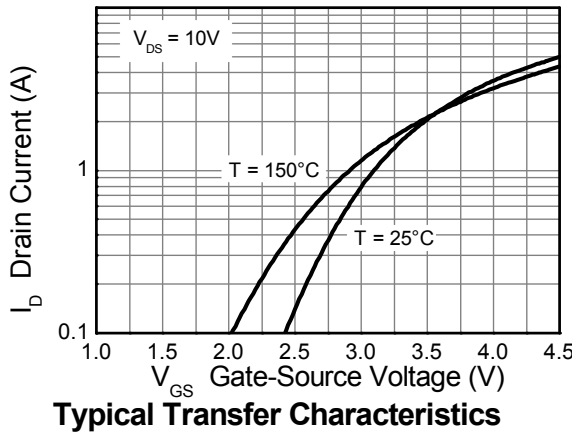
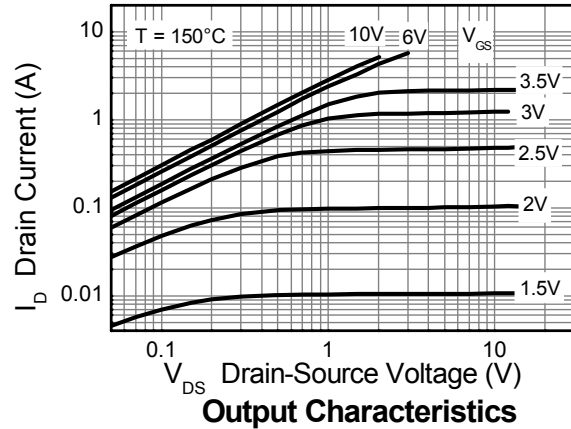
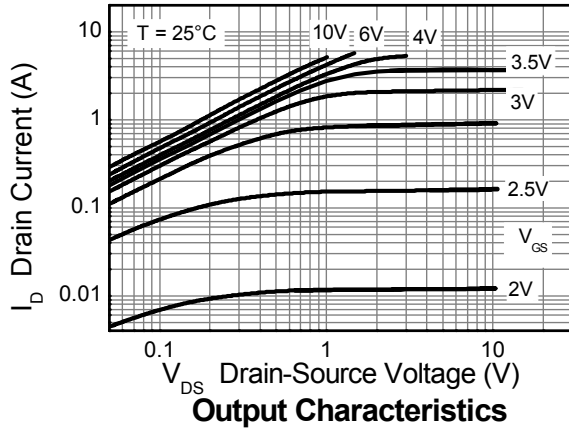


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

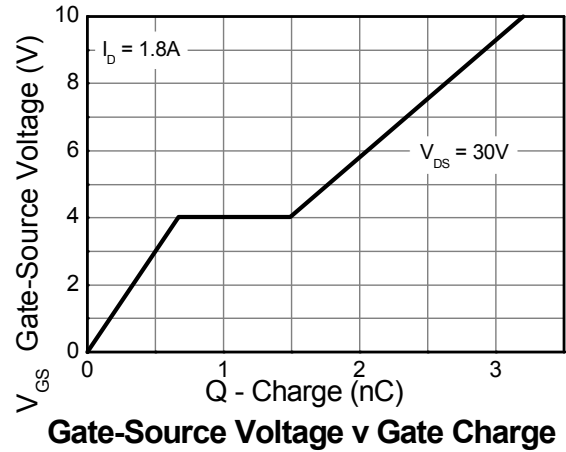
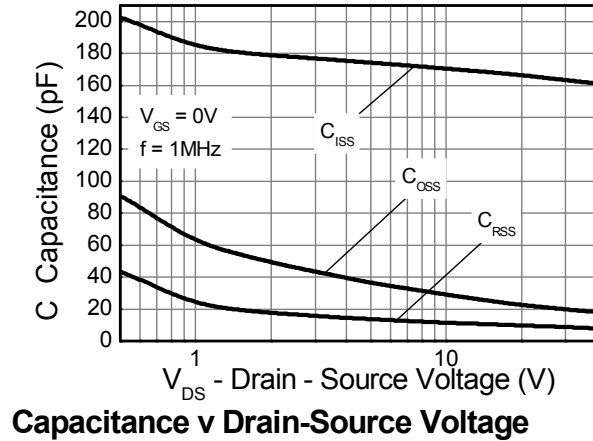
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	I _D = 250μA, V _{GS} = 0V
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 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 10)	R _{DS(on)}	—	—	0.250	Ω	V _{GS} = 10V, I _D = -1.8A
				0.350		V _{GS} = 4.5V, I _D = -1.3A
Forward Transconductance (Notes 10 and 12)	g _{fs}	—	2.3	—	S	V _{DS} = 15V, I _D = 1.8A
Diode Forward Voltage (Note 10)	V _{SD}	—	0.8	0.95	V	T _J = +25°C, I _S = 0.45A, V _{GS} = 0V
Reverse Recovery Time (Note 12)	t _{rr}	—	20.5	—	ns	T _J = +25°C, I _F = 1.8A,
Reverse Recovery Charge (Note 12)	Q _{rr}	—	21.3	—	nC	di/dt = 100A/μs
DYNAMIC CHARACTERISTICS (Note 12)						
Input Capacitance	C _{iss}	—	166	—	pF	V _{DD} = 40V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	19.5	—		
Reverse Transfer Capacitance	C _{rss}	—	8.7	—		
Turn-On Delay Time (Note 11)	t _{D(on)}	—	1.8	—	ns	V _{DD} = 30V, I _D = 1.8A, R _G ≅ 6.0Ω, V _{GS} = 10V
Turn-On Rise Time (Note 11)	t _r	—	1.4	—		
Turn-Off Delay Time (Note 11)	t _{D(off)}	—	4.9	—		
Turn-Off Fall Time (Note 11)	t _f	—	2.0	—		
Total Gate Charge (Note 11)	Q _g	—	1.65	—	nC	V _{DS} = 30V, V _{GS} = 5V, I _D = 1.8A
Total Gate Charge (Note 11)	Q _g	—	3.2	—	nC	V _{DS} = 30V, V _{GS} = 10V, I _D = 1.8A
Gate-Source Charge (Note 11)	Q _{gs}	—	0.67	—		
Gate-Drain Charge (Note 11)	Q _{gd}	—	0.82	—		

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

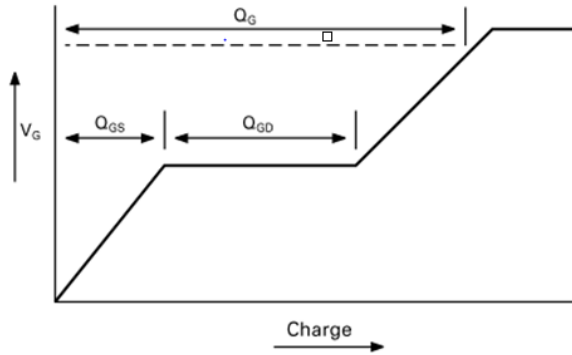
Typical Characteristics



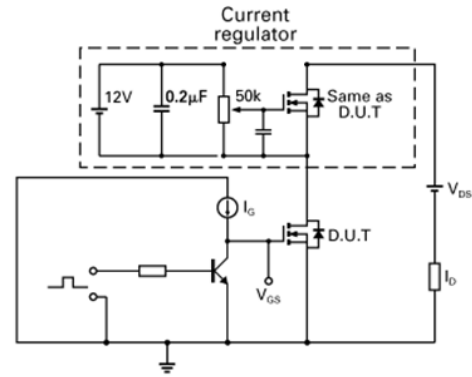
Typical Characteristics - continued



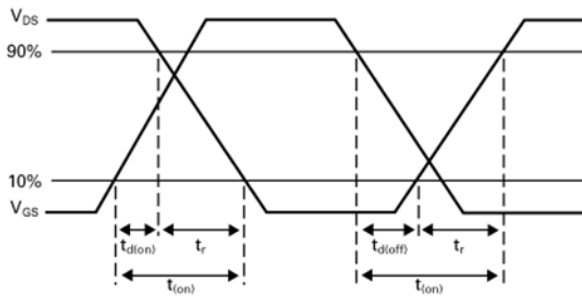
Test Circuits



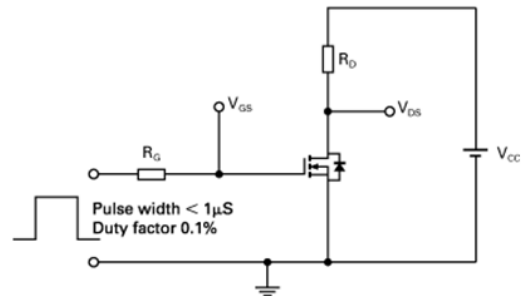
Basic gate charge waveform



Gate charge test circuit



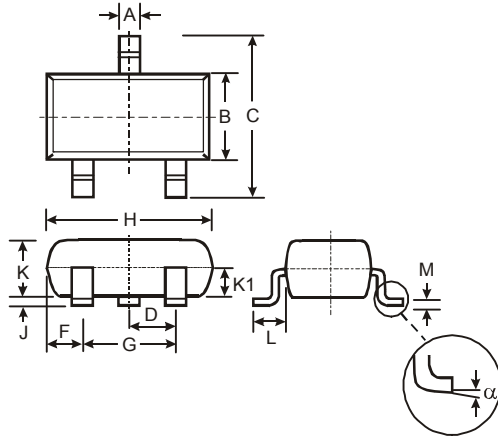
Switching time waveforms



Switching time test circuit

Package Outline Dimensions

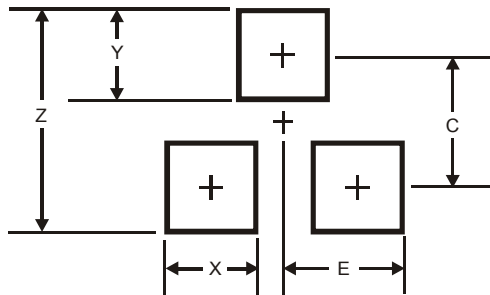
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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

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



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

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