

**60V N-CANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

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

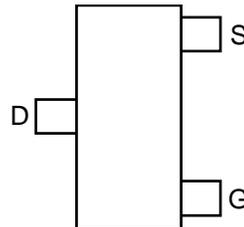
**Mechanical Data**

- 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 (E3)
- Weight: 0.008 grams (approximate)

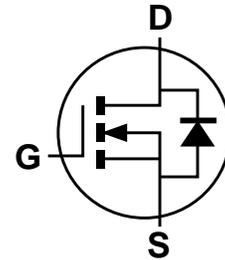
SOT23



Top View



Top View  
Pin Out



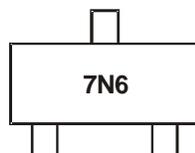
Equivalent Circuit

**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/products/packages.html>.

**Marking Information**



7N6 = Product Type Marking Code

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

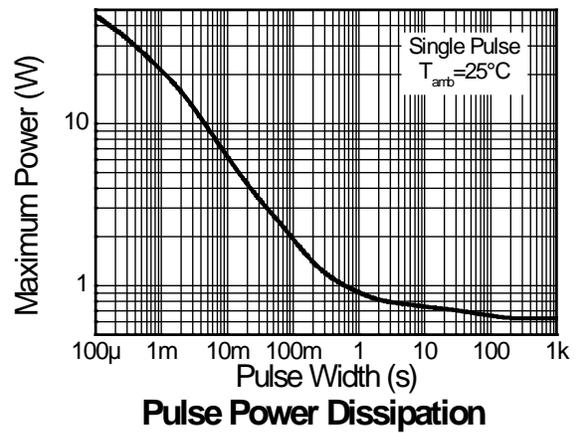
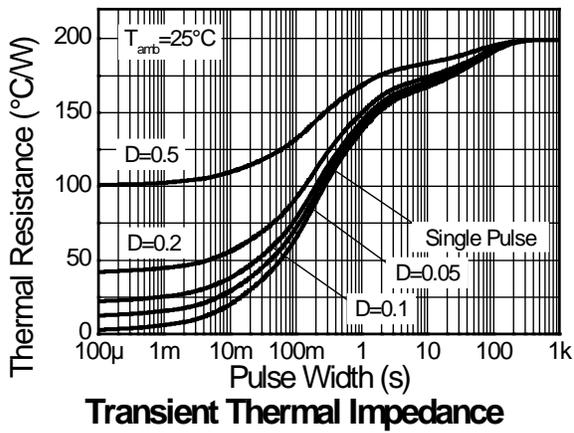
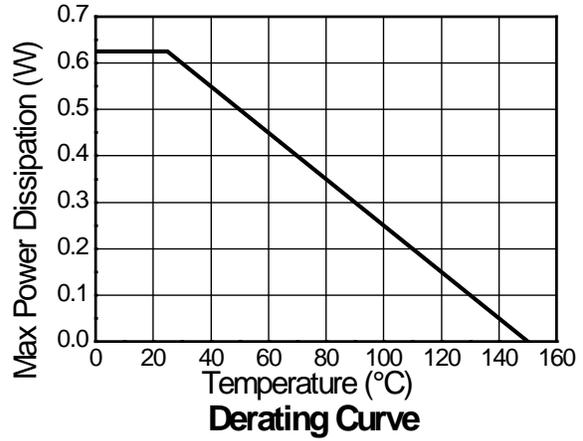
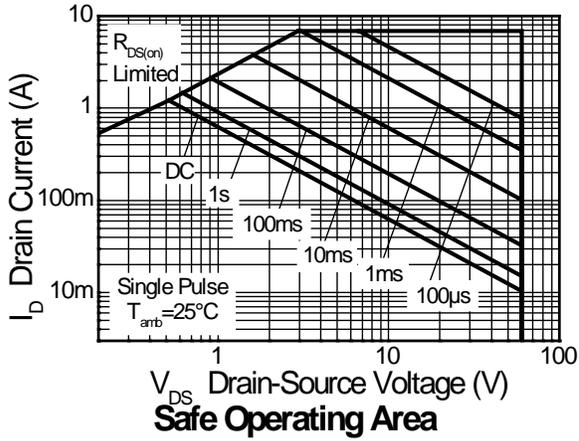
Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	60	V
Gate-Source Voltage			V <sub>GS</sub>	±20	V
Continuous Drain Current	V <sub>GS</sub> = 10V	T <sub>A</sub> = +25°C (Note 7)	I <sub>D</sub>	1.4	A
		T <sub>A</sub> = +70°C (Note 7)		1.1	
		T <sub>A</sub> = +25°C (Note 6)		1.2	
Pulsed Drain Current (Note 8)			I <sub>DM</sub>	6.9	A
Continuous Source Current (Body Diode) (Note 7)			I <sub>S</sub>	1	A
Pulsed Source Current (Body Diode) (Note 8)			I <sub>SM</sub>	6.9	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Power Dissipation (Note 6)			P <sub>D</sub>	625	mW
Linear Derating Factor				5	mW/°C
Power Dissipation (Note 7)			P <sub>D</sub>	806	mW
Linear Derating Factor				6.4	mW/°C
Thermal Resistance, Junction to Ambient	(Note 6)	R <sub>θJA</sub>	200	°C/W	
	(Note 7)		155		
Thermal Resistance, Junction to Ambient (Note 9)		R <sub>θJL</sub>	194		
Operating and Storage Temperature Range			T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°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 ≤ 5 secs.
  8. Repetitive rating 25mm x 25mm FR4 PCB, D=0.02 pulse width=300µs - pulse current limited by maximum junction temperature.
  9. Thermal resistance from junction to solder-point (at the end of the drain lead).

**Thermal Characteristics**

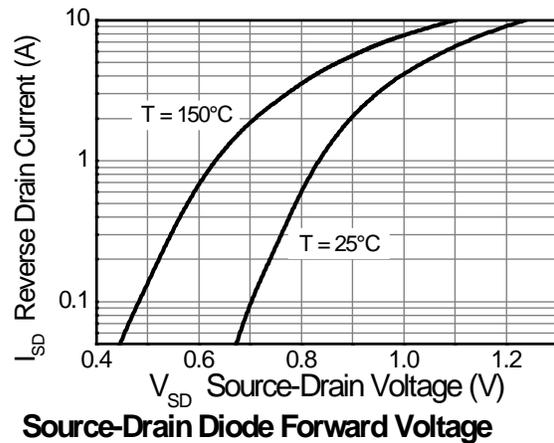
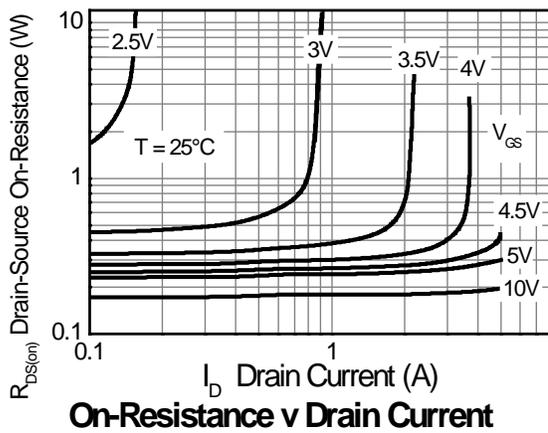
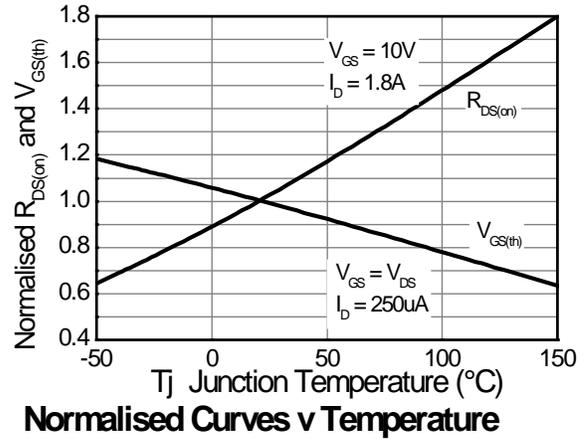
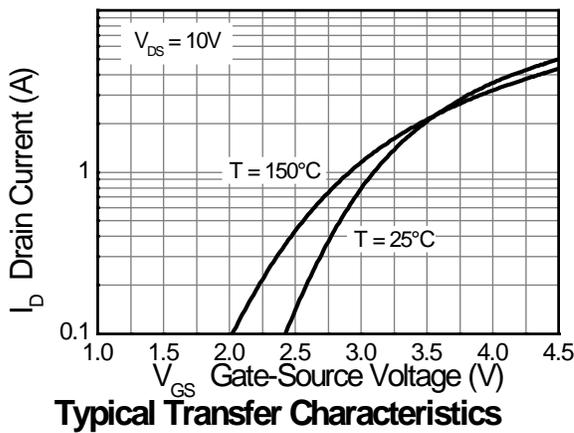
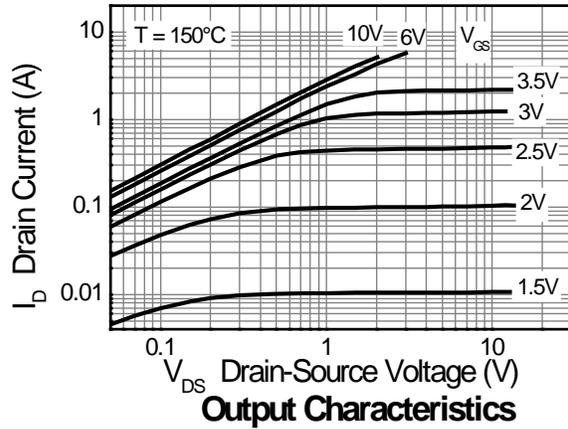
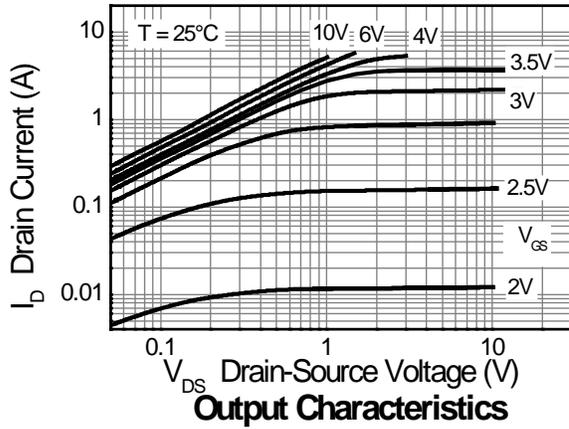


**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

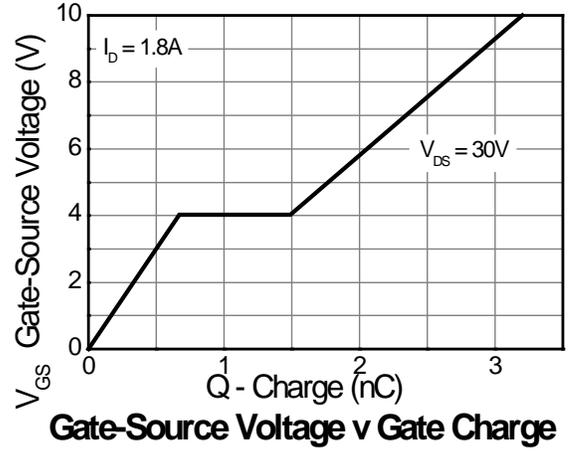
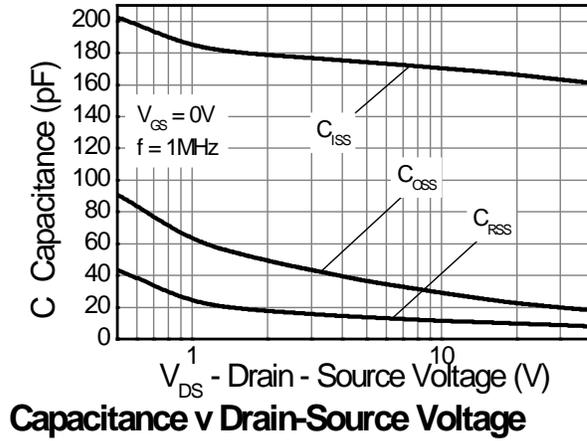
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	60	—	—	V	$I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 60\text{V}$ , $V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	$I_D = 250\mu\text{A}$ , $V_{DS} = V_{GS}$
Static Drain-Source On-Resistance (Note 10)	$R_{DS(on)}$	—	—	0.250	$\Omega$	$V_{GS} = 10\text{V}$ , $I_D = -1.8\text{A}$
				0.350		$V_{GS} = 4.5\text{V}$ , $I_D = -1.3\text{A}$
Forward Transconductance (Notes 10 and 12)	$g_{fs}$	—	2.3	—	S	$V_{DS} = 15\text{V}$ , $I_D = 1.8\text{A}$
Diode Forward Voltage (Note 10)	$V_{SD}$	—	0.8	0.95	V	$T_J = +25^\circ\text{C}$ , $I_S = 0.45\text{A}$ , $V_{GS} = 0\text{V}$
Reverse Recovery Time (Note 12)	$t_{rr}$	—	20.5	—	ns	$T_J = +25^\circ\text{C}$ , $I_F = 1.8\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge (Note 12)	$Q_{rr}$	—	21.3	—	nC	
<b>DYNAMIC CHARACTERISTICS (Note 12)</b>						
Input Capacitance	$C_{ISS}$	—	166	—	pF	$V_{DD} = 40\text{V}$ , $V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
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	$V_{DD} = 30\text{V}$ , $I_D = 1.8\text{A}$ , $R_G \cong 6.0\Omega$ , $V_{GS} = 10\text{V}$
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	$V_{DS} = 30\text{V}$ , $V_{GS} = 5\text{V}$ , $I_D = 1.8\text{A}$
Total Gate Charge (Note 11)	$Q_g$	—	3.2	—	nC	$V_{DS} = 30\text{V}$ , $V_{GS} = 10\text{V}$ , $I_D = 1.8\text{A}$
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 =  $300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .
  11. Switching characteristics are independent of operating junction temperature.
  12. For design aid only, not subject to production testing.

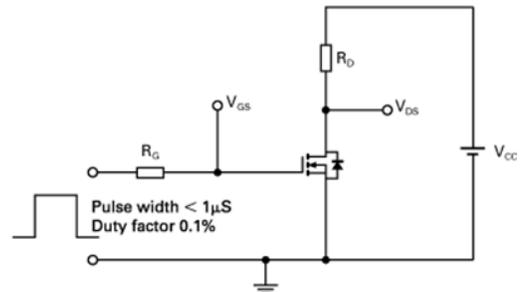
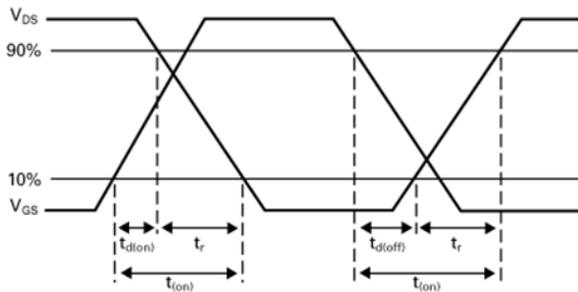
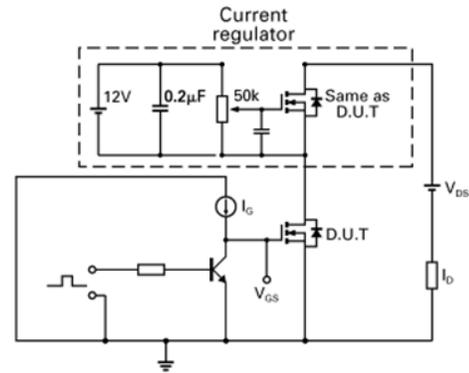
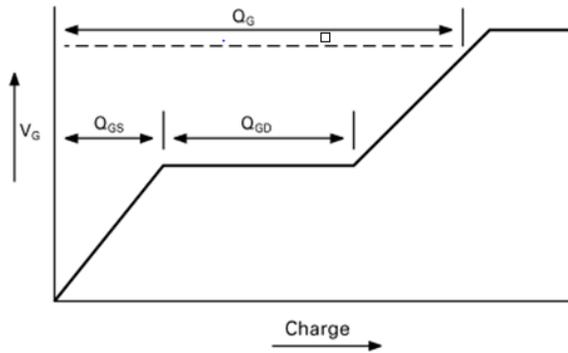
**Typical Characteristics**



**Typical Characteristics - continued**

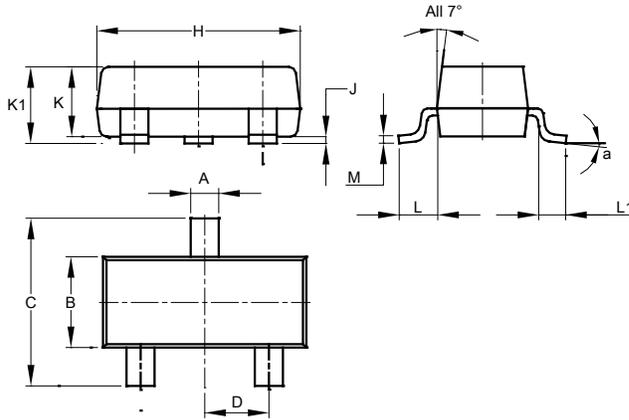


**Test Circuits**



## Package Outline Dimensions

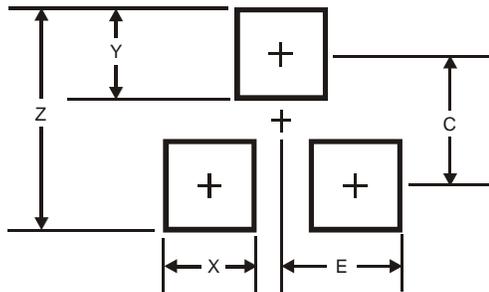
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	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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