

20V N-CHANNEL ENHANCEMENT MODE MOSFET
Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D $T_A = +25^\circ\text{C}$
20V	0.12Ω @ $V_{GS} = 10\text{V}$	2.2A

Description

This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

- DC-DC Converters
- Power Management Functions
- Motor Control

Features

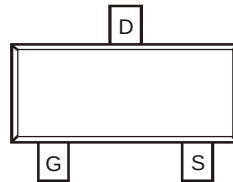
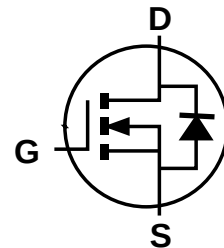
- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive
- Small Surface Mount Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Solderable per MIL-STD-202, Method 208e3
- Lead-free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- Weight: 0.006 grams (approximate)



Top View

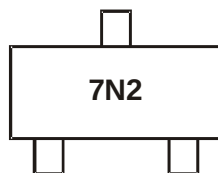

 Top View
 Pin Configuration


Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
ZXMN2A01FTA	SOT23	3,000/Tape & Reel
ZXMN2A01FTC	SOT23	10,000/Tape & Reel

- 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/quality/lead_free.html 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 <http://www.diodes.com/products/packages.html>.

Marking Information


7N2 = Product Type Marking Code

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DS}	20	V
Gate-Source Voltage			V_{GS}	± 12	V
Continuous Drain Current, $V_{GS} = 10\text{V}$	(Note 6)	$T_A = +25^\circ\text{C}$	I_D	2.2	A
	(Note 6)	$T_A = +70^\circ\text{C}$		1.7	
	(Note 5)	$T_A = +25^\circ\text{C}$		1.9	
Pulsed Drain Current (Note 7)			I_{DM}	8	A
Maximum Body Diode Continuous Current (Note 6)			I_S	1.29	A
Maximum Body Diode Continuous Current (Note 7)			I_{SM}	8	A

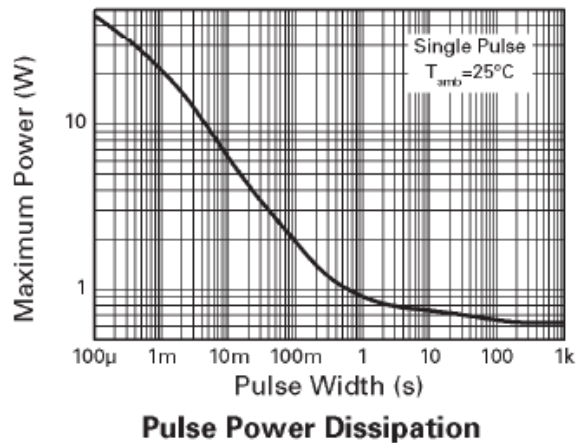
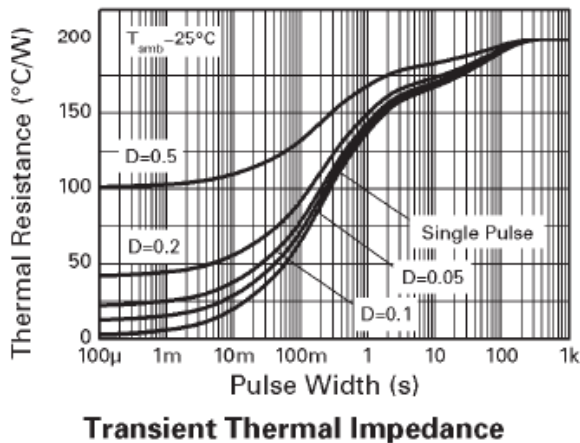
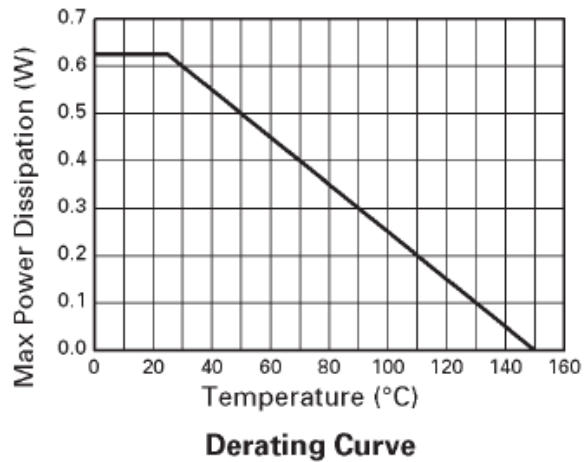
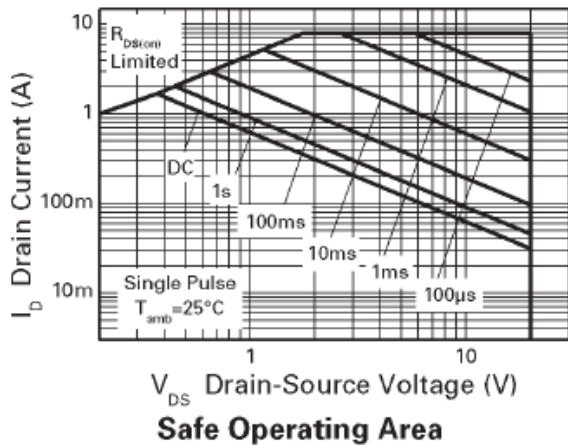
Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

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

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.

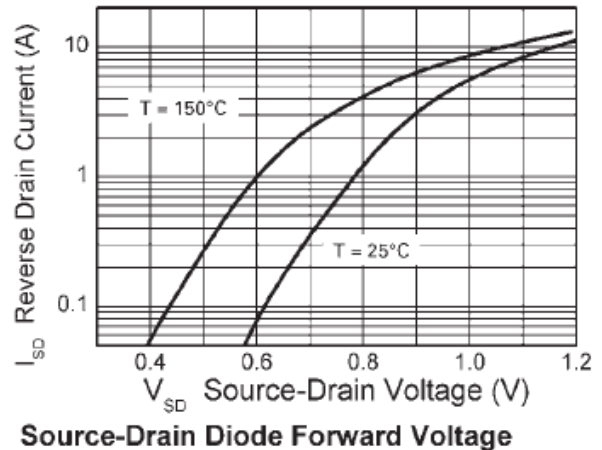
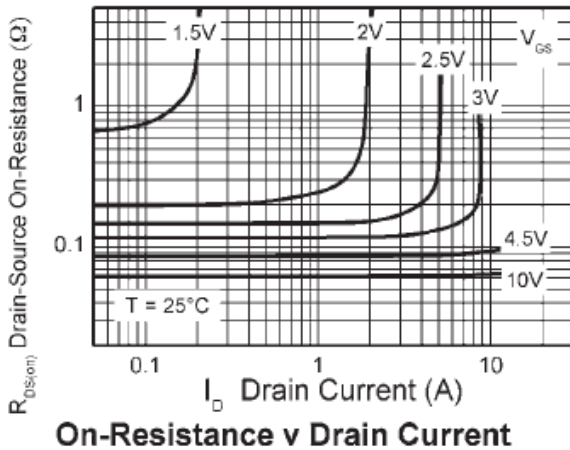
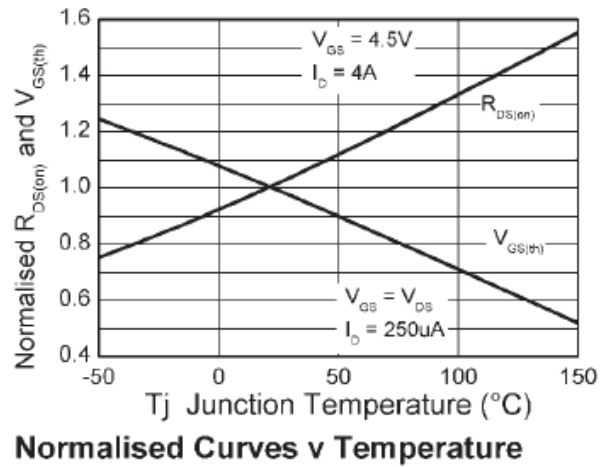
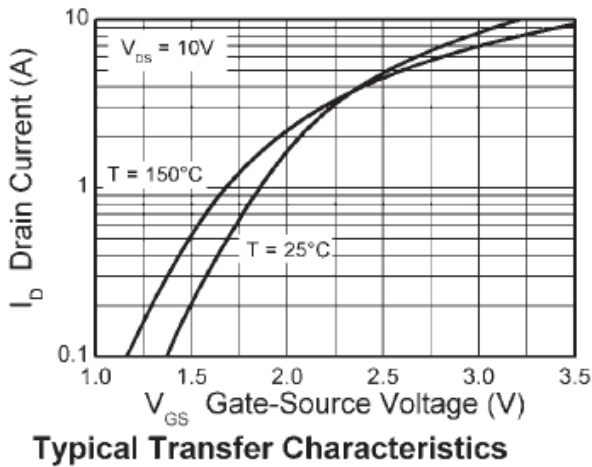
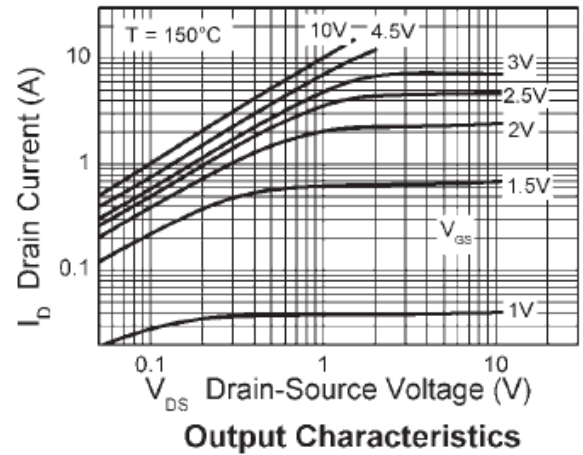
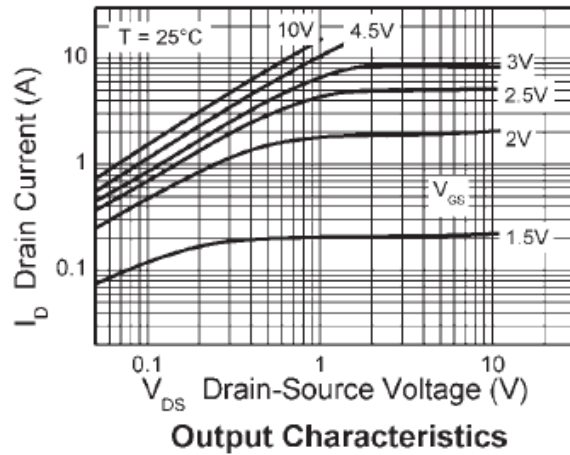
 6. For a device surface mounted on FR-4 PCB measured at $t \leq 5$ secs.

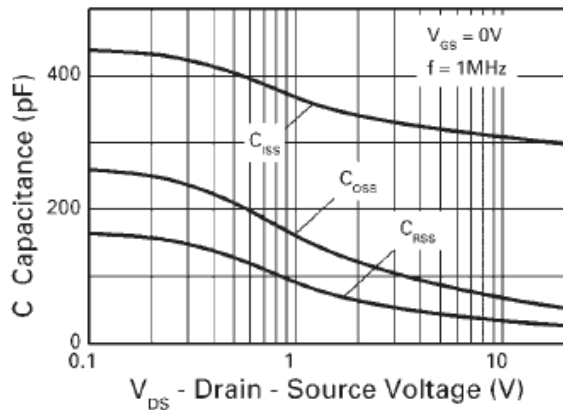
 7. Repetitive rating 25mm x 25mm FR4 PCB, $D = 0.05$, pulse width 10 μs - pulse width limited by maximum junction temperature. Refer to Transient Thermal Impedance graph.


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

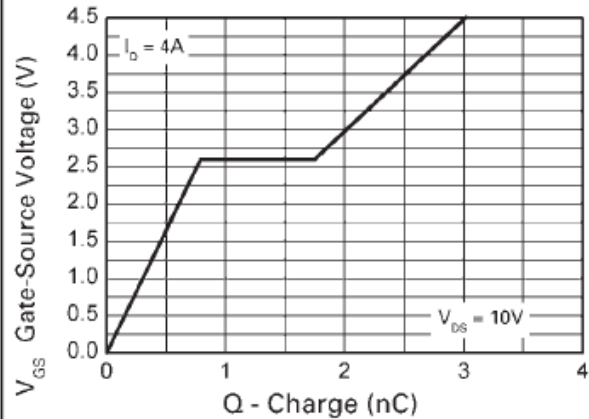
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	20	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 20V, V _{GS} = 0V
Gate-Body Leakage	I _{GSS}	—	—	100	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(th)}	0.7	—	—	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance (Note 8)	R _{DS(on)}	—	—	0.12	Ω	V _{GS} = 4.5V, I _D = 4A
		—	—	0.225	Ω	V _{GS} = 2.5V, I _D = 1.5A
Forward Transconductance	g _{FS}	—	6.1	—	S	V _{DS} = 10V, I _D = 4A
Diode Forward Voltage (Note 8 & 10)	V _{SD}	—	0.85	0.95	V	V _{GS} = 0V, I _S = 3.2A, T _J = +25°C
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iss}	—	303	—	pF	V _{DS} = 15V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	59	—		
Reverse Transfer Capacitance	C _{rss}	—	30	—		
Total Gate Charge (Note 9)	Q _g	—	3.0	—	nC	V _{DS} = 10V, V _{GS} = 10V, I _D = 4A
Gate-Source Charge (Note 9)	Q _{gs}	—	0.8	—		
Gate-Drain Charge (Note 9)	Q _{gd}	—	1.0	—		
Turn-On Delay Time (Note 9)	t _{D(on)}	—	2.49	—	ns	V _{DD} = 10V, I _D = 4A, R _G = 6Ω, V _{GS} = 5V
Turn-On Rise Time (Note 9)	t _r	—	5.21	—		
Turn-Off Delay Time (Note 9)	t _{D(off)}	—	7.47	—		
Turn-Off Fall Time (Note 9)	t _f	—	4.62	—		
Reverse Recovery Time	t _{rr}	—	23	—	ns	T _J = +25°C, I _F = 4A, di/dt = 100A/μs
Reverse Recovery Charge	Q _{rr}	—	5.65	—	nC	

Notes: 8. Measured under pulsed conditions. Width=300μs. Duty cycle ≤ 2%.
9. Switching characteristics are independent of operating junction temperature.
10. Guaranteed by design. Not subject to production testing.

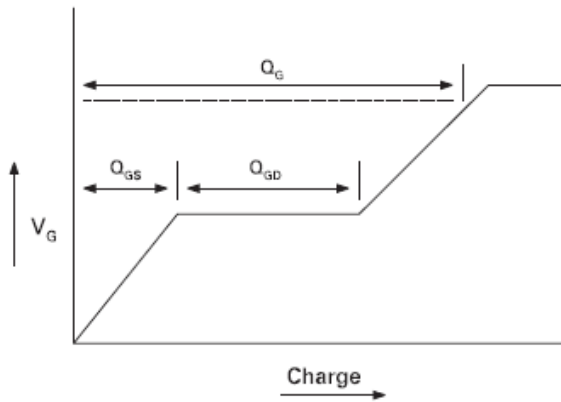




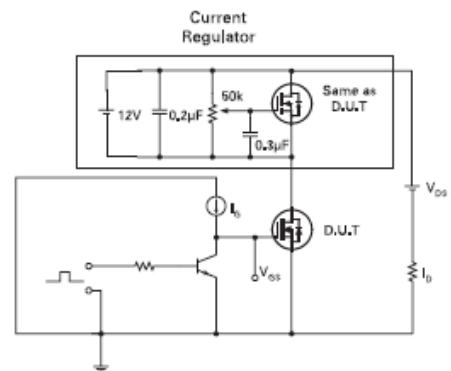
Capacitance v Drain-Source Voltage



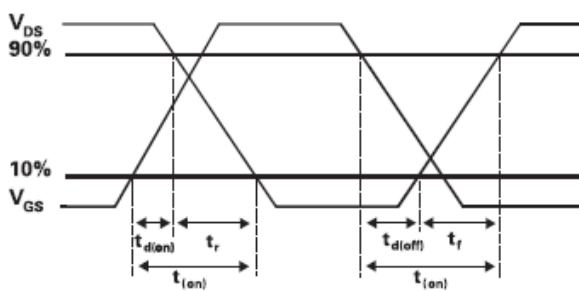
Gate-Source Voltage v Gate Charge



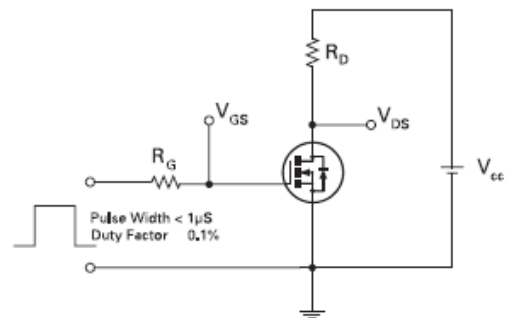
Basic Gate Charge Waveform



Gate Charge Test Circuit



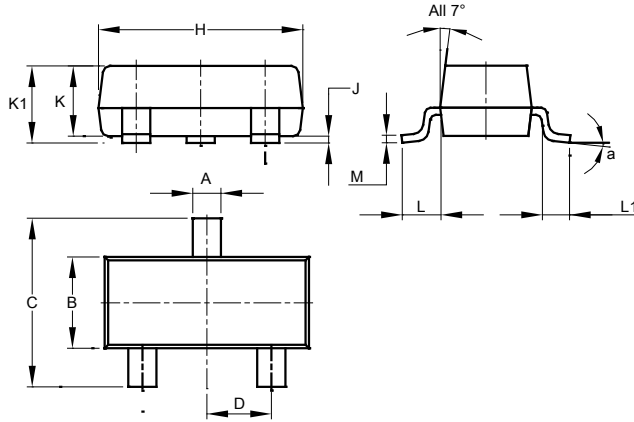
Switching Time Waveforms



Switching Time Test Circuit

Package Outline Dimensions

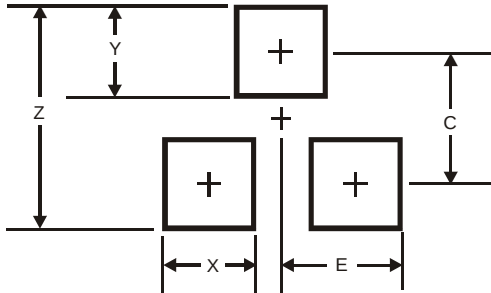
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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	0.890	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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