

## Product Summary

<b><math>V_{(BR)DSS}</math></b>	<b>Max <math>R_{DS(ON)}</math></b>	<b>Max <math>I_D</math> <math>T_A = +25^\circ C</math> (Note 6)</b>
20V	120m $\Omega$ @ $V_{GS} = 4.5V$	3.1A

## Description and Applications

This new generation of trench MOSFETs from Zetex utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage, power management applications.

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

## Features and Benefits

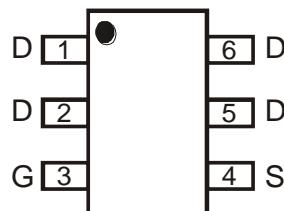
- Low On-resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability

## Mechanical Data

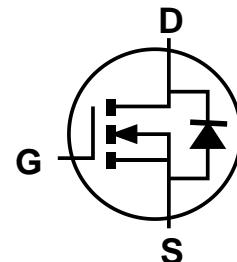
- Case: SOT26
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.016 grams (Approximate)



Top View



Pin-Out (Top View)



Equivalent Circuit

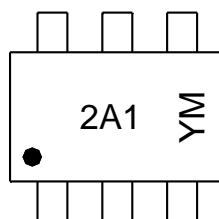
## Ordering Information (Note 4)

Part Number	Marking	Reel Size (inch)	Tape Width (mm)	Quantity Per Reel
ZXMN2A01E6TA	2A1	7	8	3000
ZXMN2A01E6TC	2A1	13	8	10,000

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](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



2A1 = Product Type Marking Code

YM = Date Code Marking

Y or  $\bar{Y}$  = Year (ex: C = 2015)

M or  $\bar{M}$  = Month (ex: 9 = September)

### Date Code Key

Year	2015	2016	2017	2018	2019	2020	2021	2022				
Code	C	D	E	F	G	H	I	J				
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

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

Characteristic			Symbol	Value	Unit	
Drain-Source Voltage			$V_{DSS}$	20	V	
Gate-Source Voltage			$V_{GSS}$	$\pm 12$	V	
Continuous Drain Current	$V_{GS} = 10\text{V}$	$T_A = +25^\circ\text{C}$ (Note 6)	$I_D$	3.1	A	
		$T_A = +70^\circ\text{C}$ (Note 6)		2.5		
		$T_A = +25^\circ\text{C}$ (Note 5)		2.5		
Pulsed Drain Current (Note 7)			$I_{DM}$	11	A	
Continuous Source Current (Body Diode) (Note 6)			$I_S$	2.4	A	
Pulsed Source Current (Body Diode) (Note 7)			$I_{SM}$	11	A	

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

Characteristic	Symbol	Value	Unit
Power Dissipation at $T_A = +25^\circ\text{C}$ (Note 5)	$P_D$	1.1	W
Linear derating factor		8.8	$\text{mW}/^\circ\text{C}$
Power Dissipation at $T_A = +25^\circ\text{C}$ (Note 6)	$P_D$	1.7	W
Linear Derating Factor		13.6	$\text{mW}/^\circ\text{C}$
Junction to Ambient (Note 5)	$R_{\theta JA}$	113	$^\circ\text{C}/\text{W}$
Junction to Ambient (Note 6)	$R_{\theta JA}$	70	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

Notes:

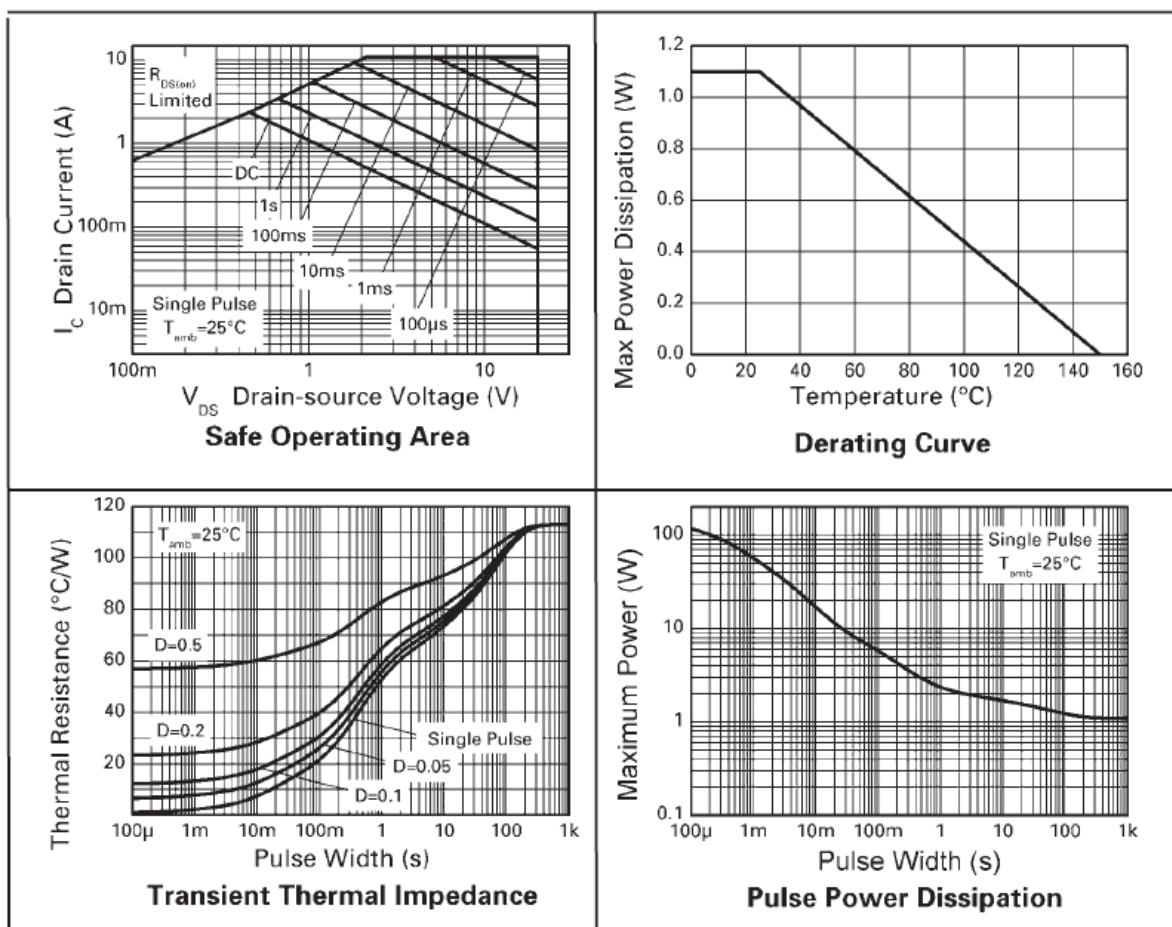
5. For a device surface mounted on 25mm x 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
6. For a device surface mounted on FR-4 PCB measured at  $t \leq 10$  secs.
7. Repetitive rating 25mm x 25mm FR-4 PCB,  $D = 0.05$ , pulse width 10 $\mu\text{s}$  - pulse width limited by maximum junction temperature. Refer to Transient Thermal Impedance graph.

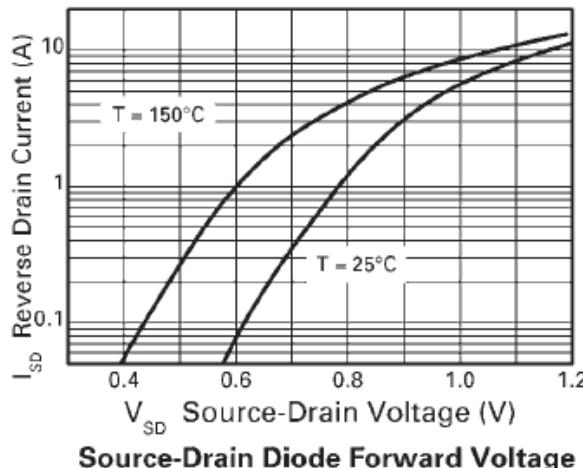
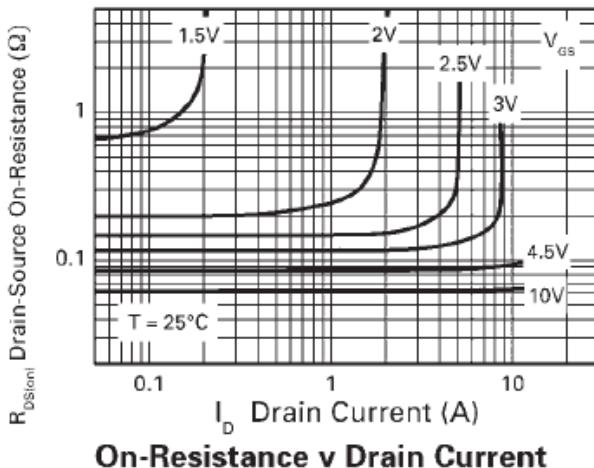
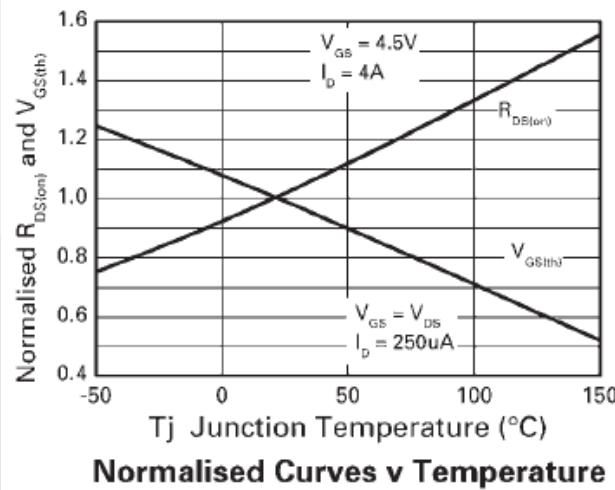
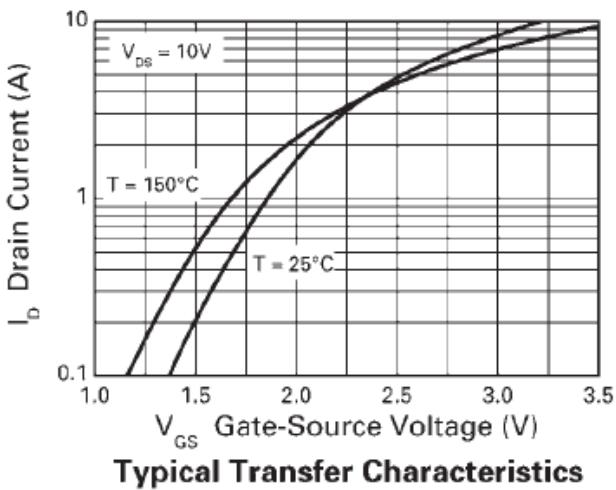
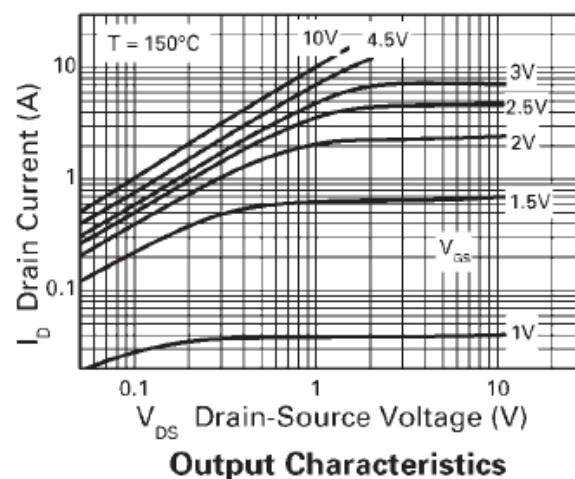
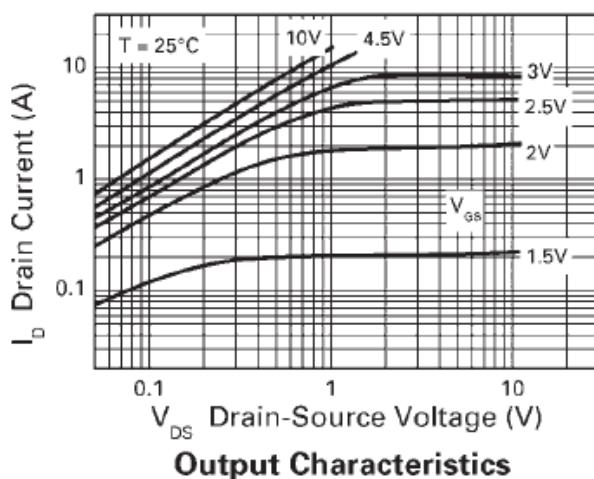
**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

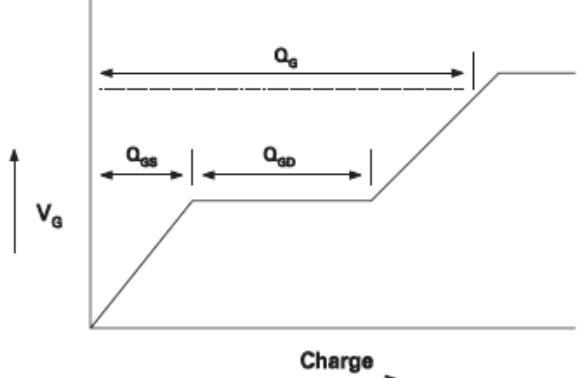
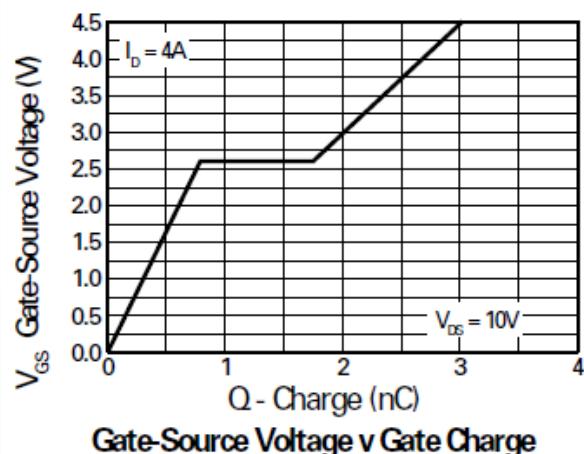
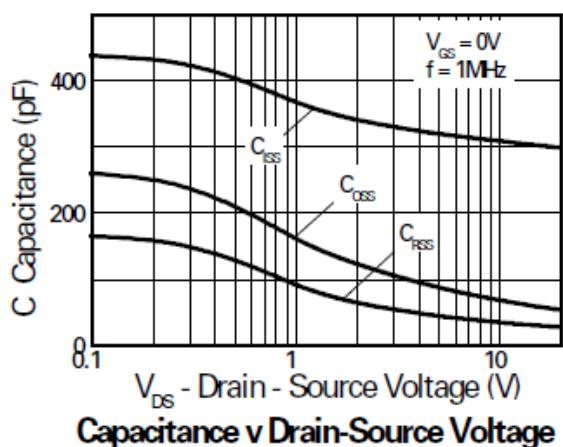
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	20	-	-	V	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	$I_{DSS}$	-	-	1	$\mu\text{A}$	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}$
Gate-Body Leakage	$I_{GSS}$	-	-	100	$\text{nA}$	$V_{GS} = \pm 12\text{V}, V_{DS} = 0\text{V}$
Gate-Source Threshold Voltage	$V_{GS(TH)}$	0.7	-	-	V	$I_D = 250\mu\text{A}, V_{DS} = V_{GS}$
Static Drain-Source On-State Resistance (Note 8)	$R_{DS(ON)}$	-	-	0.120	$\Omega$	$V_{GS} = 4.5\text{V}, I_D = 4\text{A}$
				0.225		$V_{GS} = 2.5\text{V}, I_D = 1.5\text{A}$
Forward Transconductance (Notes 8 & 10)	$g_{fs}$	-	6.1	-	S	$V_{DS} = 10\text{V}, I_D = 4\text{A}$
Diode Forward Voltage (Note 8)	$V_{SD}$	-	0.9	0.95	V	$T_J = +25^\circ\text{C}, I_S = 3.2\text{A}, V_{GS} = 0\text{V}$
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance (Note 10)	$C_{iss}$	-	303	-	$\text{pF}$	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output Capacitance (Note 10)	$C_{oss}$	-	59	-	$\text{pF}$	
Reverse Transfer Capacitance (Note 10)	$C_{rss}$	-	30	-	$\text{pF}$	
Total Gate Charge (Notes 9 & 10)	$Q_g$	-	3.0	-	$\text{nC}$	$V_{GS} = 4.5\text{V}, V_{DS} = 10\text{V}$ $I_D = 4\text{A}$
Gate-Source Charge (Notes 9 & 10)	$Q_{gs}$	-	0.8	-	$\text{nC}$	
Gate-Drain Charge (Notes 9 & 10)	$Q_{gd}$	-	1.0	-	$\text{nC}$	
Turn-On Delay Time (Notes 9 & 10)	$t_{D(ON)}$	-	2.49	-	ns	$V_{DD} = 10\text{V}, V_{GS} = 5\text{V}$ $I_D = 4\text{A}, R_G = 6.0\Omega$
Turn-On Rise Time (Notes 9 & 10)	$t_R$	-	5.21	-	ns	
Turn-Off Delay Time (Notes 9 & 10)	$t_{D(OFF)}$	-	7.47	-	ns	
Turn-Off Fall Time (Notes 9 & 10)	$t_F$	-	4.62	-	ns	
Reverse Recovery Time (Note 10)	$t_{RR}$	-	23	-	ns	$T_J = +25^\circ\text{C}, I_F = 4\text{A},$ $di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge (Note 10)	$Q_{RR}$	-	5.65	-	$\text{nC}$	

Notes:

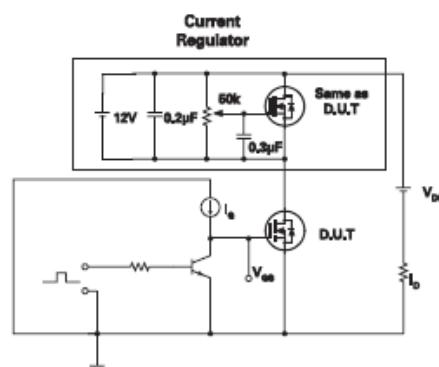
8. Measured under pulsed conditions. Width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .
9. Switching characteristics are independent of operating junction temperature.
10. For design aid only, not subject to production testing.



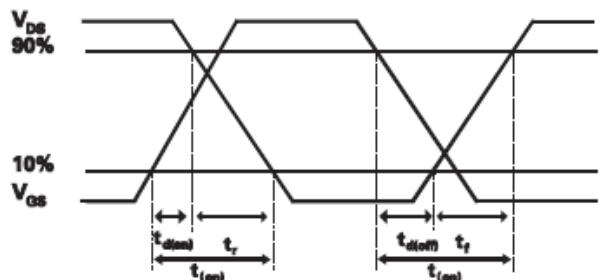




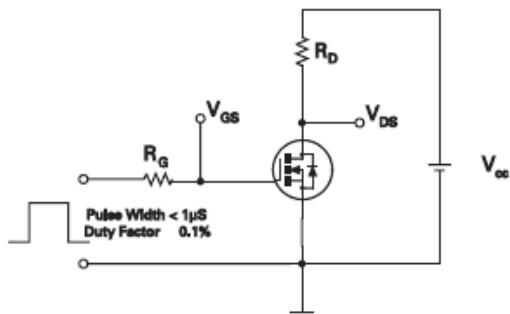
Basic Gate Charge Waveform



Gate Charge Test Circuit



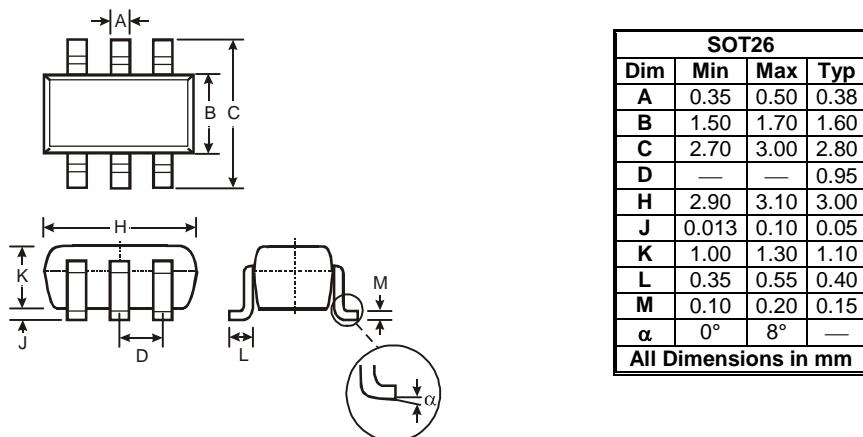
Switching Time Waveforms



Switching Time Test Circuit

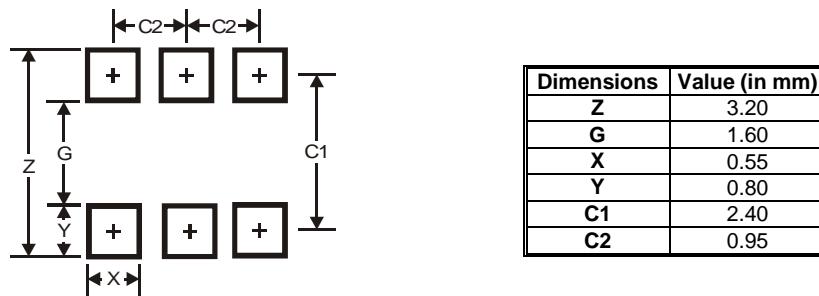
## Package Outline Dimensions

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



## Suggested Pad Layout

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



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