20V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	Max $R_{DS(ON)}$	Max I_D T_A = +25°C (Note 6)
20V	120mΩ @ V_{GS} = 4.5V	3.1A

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**

Description and Applications

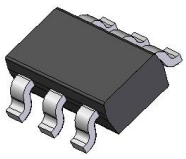
This new generation of trench MOSFETs from Zetex utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage, power management applications.

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

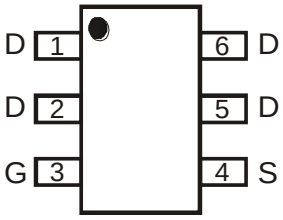
Mechanical Data

- 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)

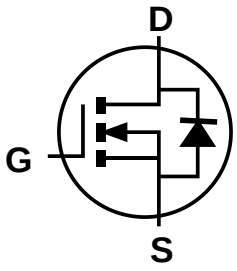
SOT26



Top View



Pin-Out (Top View)



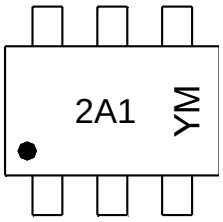
Equivalent Circuit

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

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Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	±12	V
Continuous Drain Current	V_{GS} = 10V	T_A = +25°C (Note 6)	I_D	3.1	A
		T_A = +70°C (Note 6)		2.5	
		T_A = +25°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°C, unless otherwise specified.)

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

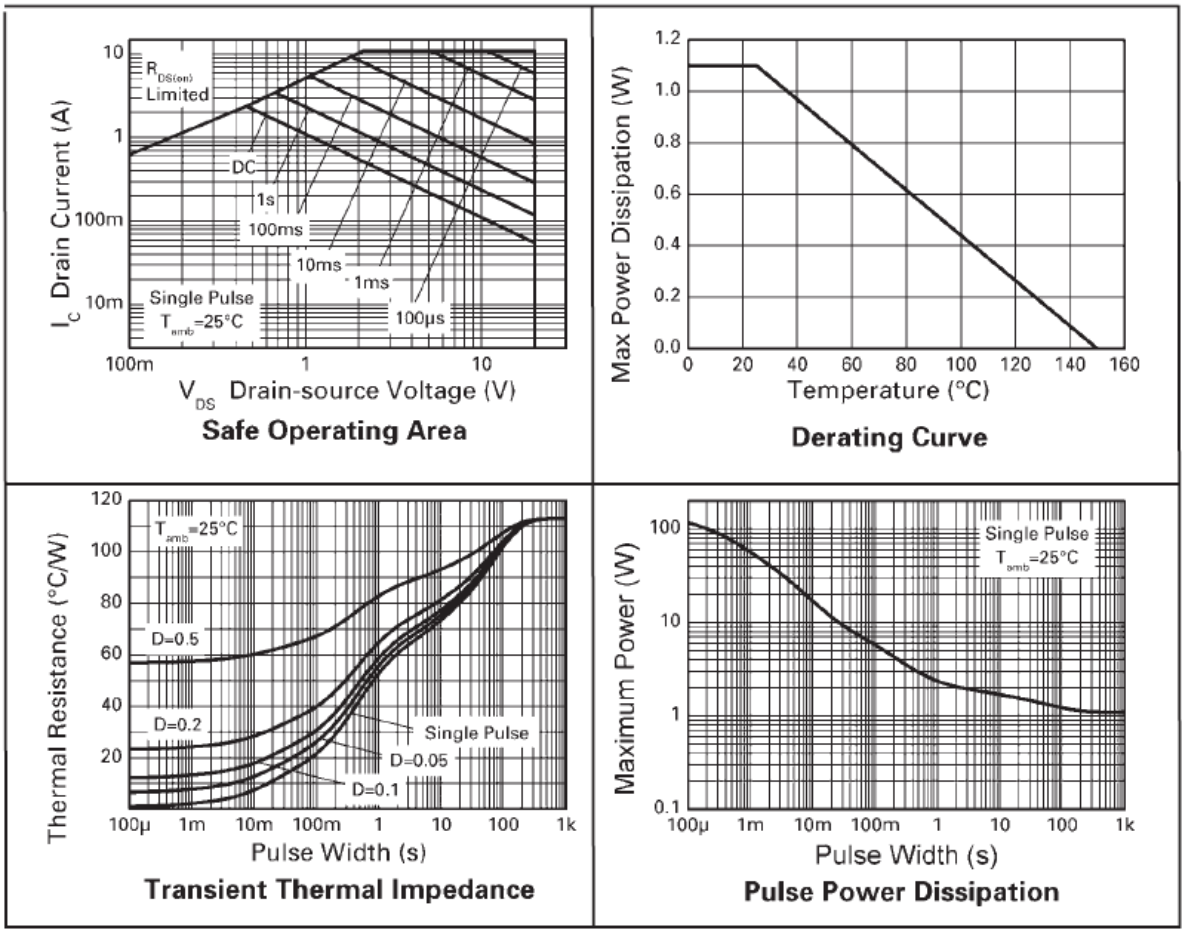
Notes: 5. For a device surface mounted on 25mm x 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
6. For a device surface mounted on FR-4 PCB measured at t≦10 secs.
7. Repetitive rating 25mm x 25mm FR-4 PCB, D = 0.05, pulse width 10µs - pulse width limited by maximum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

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

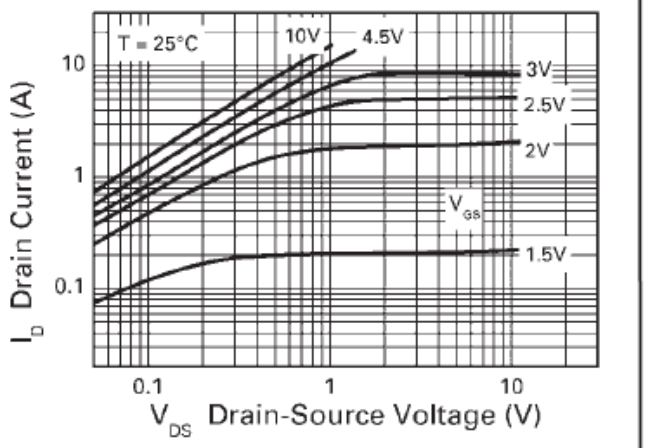
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	20	-	-	V	I_D = 250µA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	-	-	1	µA	V_{DS} = 20V, V_{GS} = 0V
Gate-Body Leakage	I_{GSS}	-	-	100	nA	V_{GS} = ±12V, V_{DS} = 0V
Gate-Source Threshold Voltage	$V_{GS(TH)}$	0.7	-	-	V	I_D = 250µA, V_{DS} = V_{GS}
Static Drain-Source On-State Resistance (Note 8)	$R_{DS(ON)}$	-	-	0.120	Ω	V_{GS} = 4.5V, I_D =4A
				0.225		V_{GS} = 2.5V, I_D =1.5A
Forward Transconductance (Notes 8 &10)	g_{fs}	-	6.1	-	S	V_{DS} = 10V, I_D =4A
Diode Forward Voltage (Note 8)	V_{SD}	-	0.9	0.95	V	T_J = +25°C , I_S = 3.2A, V_{GS} = 0V
DYNAMIC CHARACTERISTICS						
Input Capacitance (Note 10)	C_{iss}	-	303	-	pF	V_{DS} = 15V, V_{GS} = 0V f = 1MHz
Output Capacitance (Note 10)	C_{oss}	-	59	-	pF	
Reverse Transfer Capacitance (Note 10)	C_{rss}	-	30	-	pF	
Total Gate Charge (Notes 9 & 10)	Q_g	-	3.0	-	nC	V_{GS} = 4.5V, V_{DS} = 10V I_D = 4A
Gate-Source Charge (Notes 9 & 10)	Q_{gs}	-	0.8	-	nC	
Gate-Drain Charge (Notes 9 & 10)	Q_{gd}	-	1.0	-	nC	
Turn-On Delay Time (Notes 9 & 10)	$t_{D(ON)}$	-	2.49	-	ns	V_{DD} = 10V, V_{GS} = 5V I_D = 4A, R_G = 6.0Ω
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°C, I_F=4A, di/dt= 100A/µs
Reverse Recovery Charge (Note 10)	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. For design aid only, not subject to production testing.

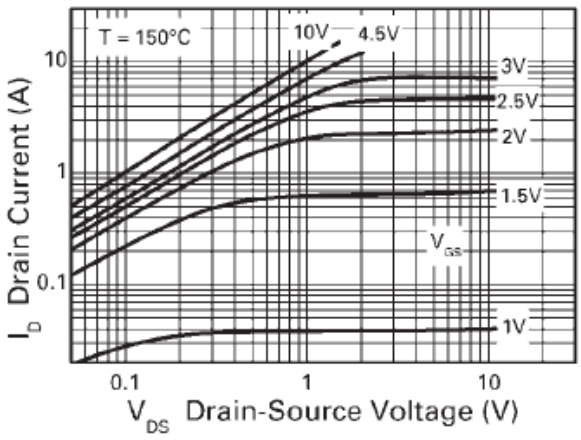
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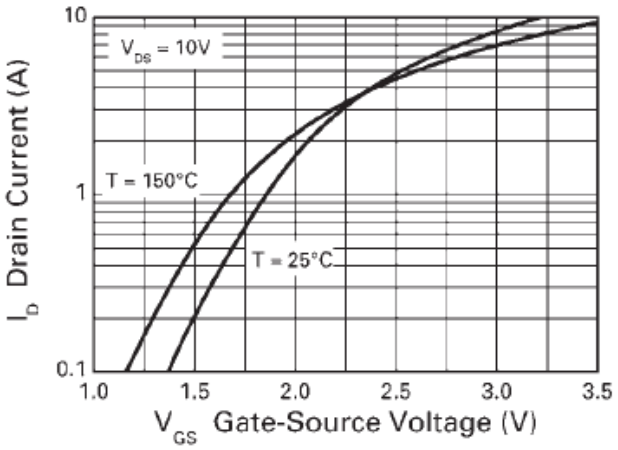
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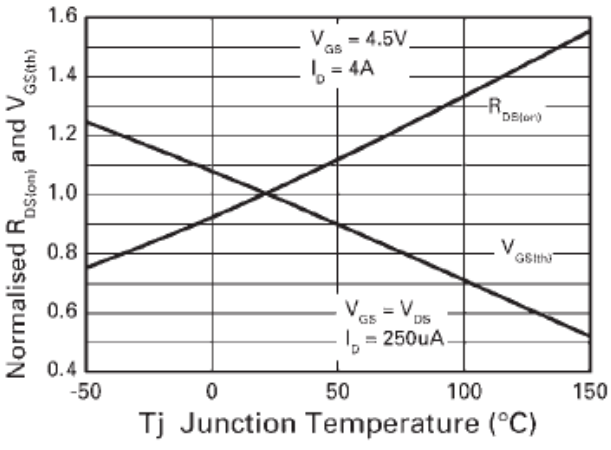
Output Characteristics



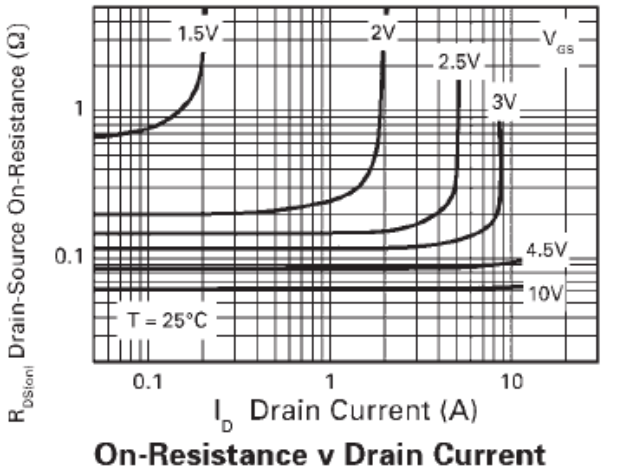
Output Characteristics



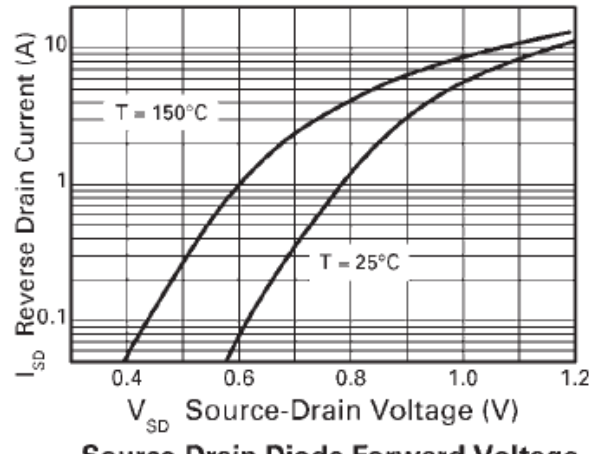
Typical Transfer Characteristics



Normalised Curves v Temperature

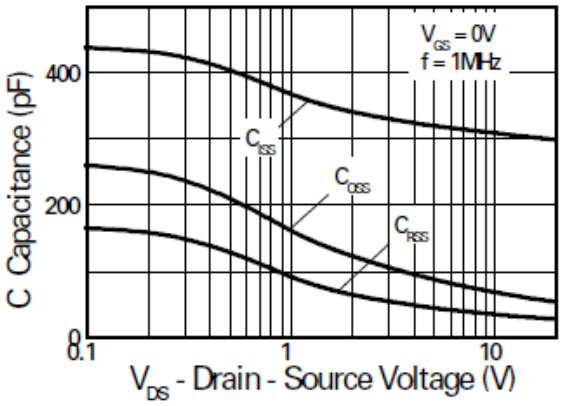


On-Resistance v Drain Current

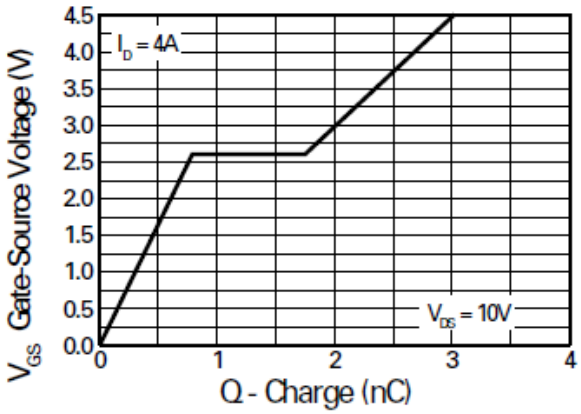


Source-Drain Diode Forward Voltage

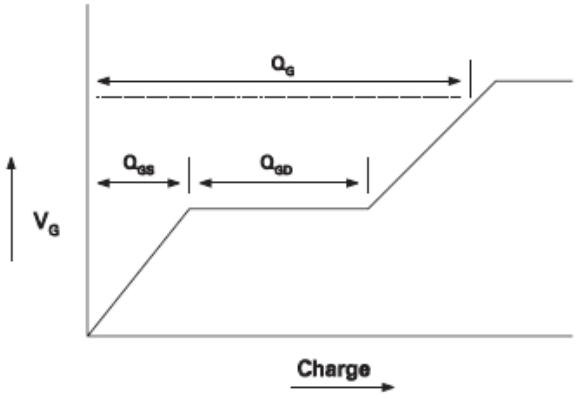
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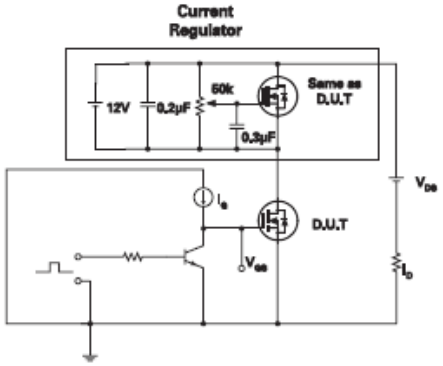
Capacitance v Drain-Source Voltage



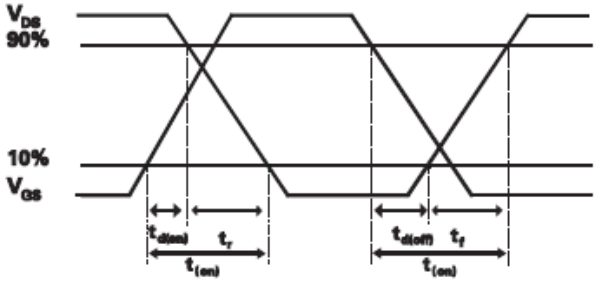
Gate-Source Voltage v Gate Charge



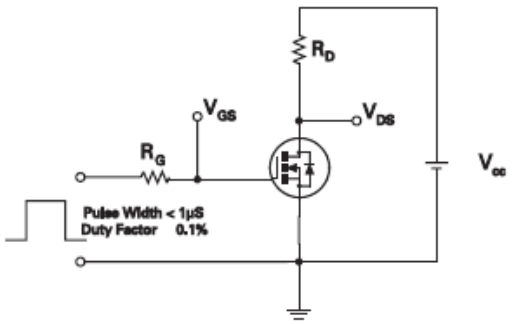
Basic Gate Charge Waveform



Gate Charge Test Circuit



Switching Time Waveforms

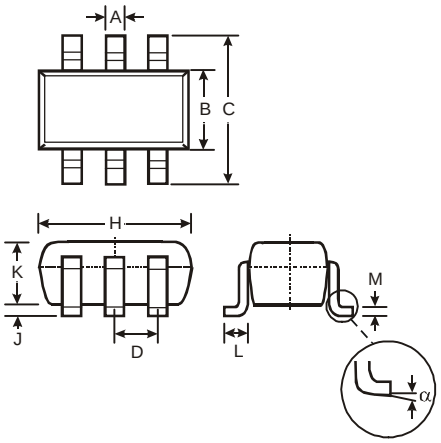


Switching Time Test Circuit

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Package Outline Dimensions

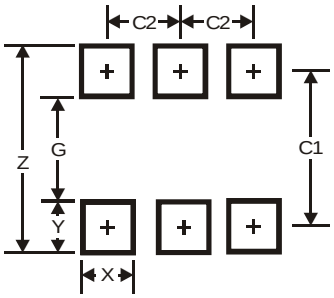
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



SOT26			
Dim	**Min**	**Max**	**Typ**
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	—	—	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
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	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

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