

**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**

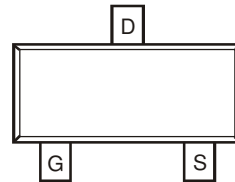
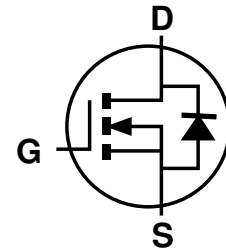
- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive
- Small Surface Mount Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**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

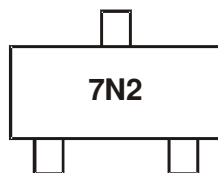

 Top View  
Pin Configuration


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](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

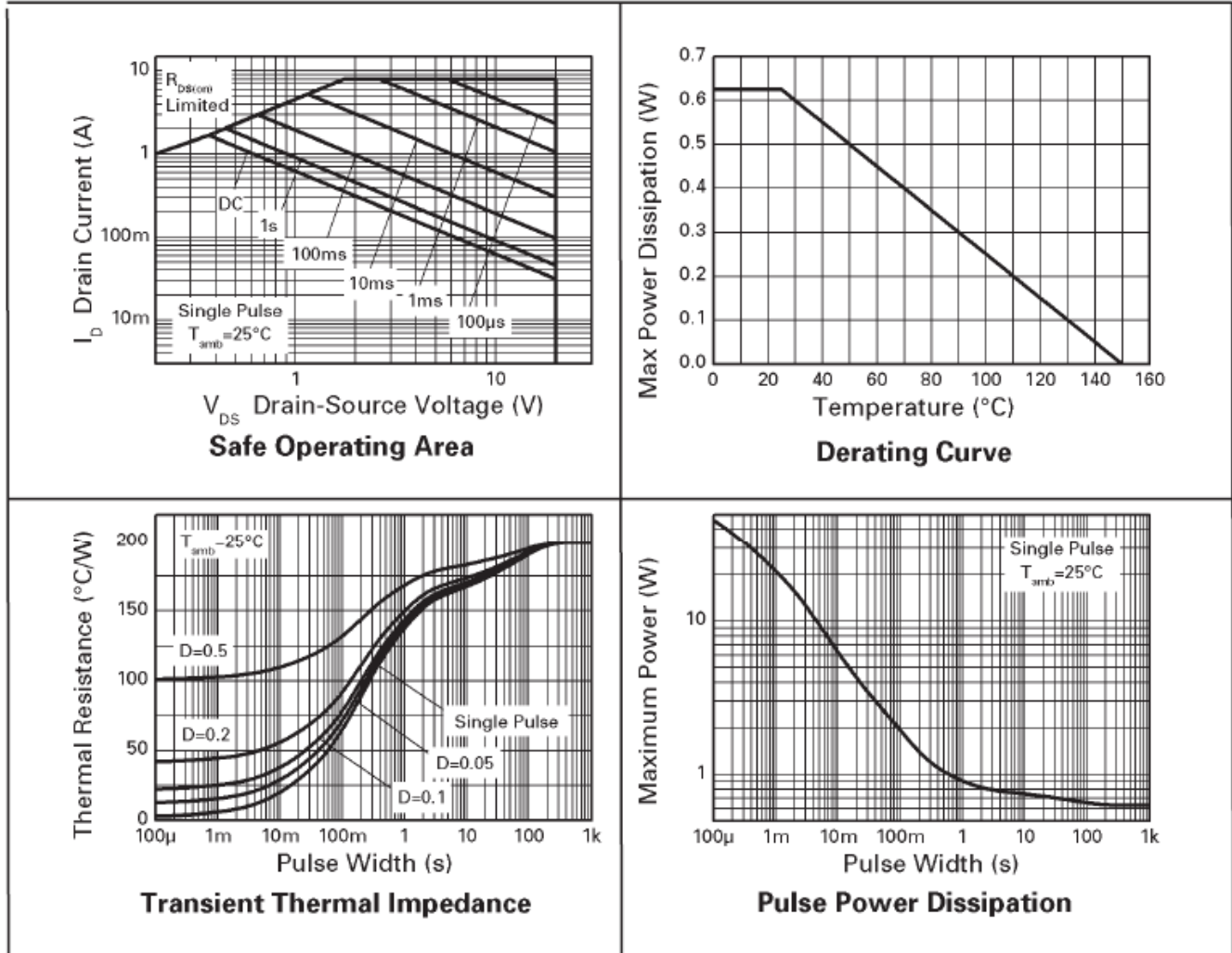
**Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DSS}$	20	V
Gate-Source Voltage			$V_{GSS}$	$\pm 12$	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	$^\circ\text{C}$

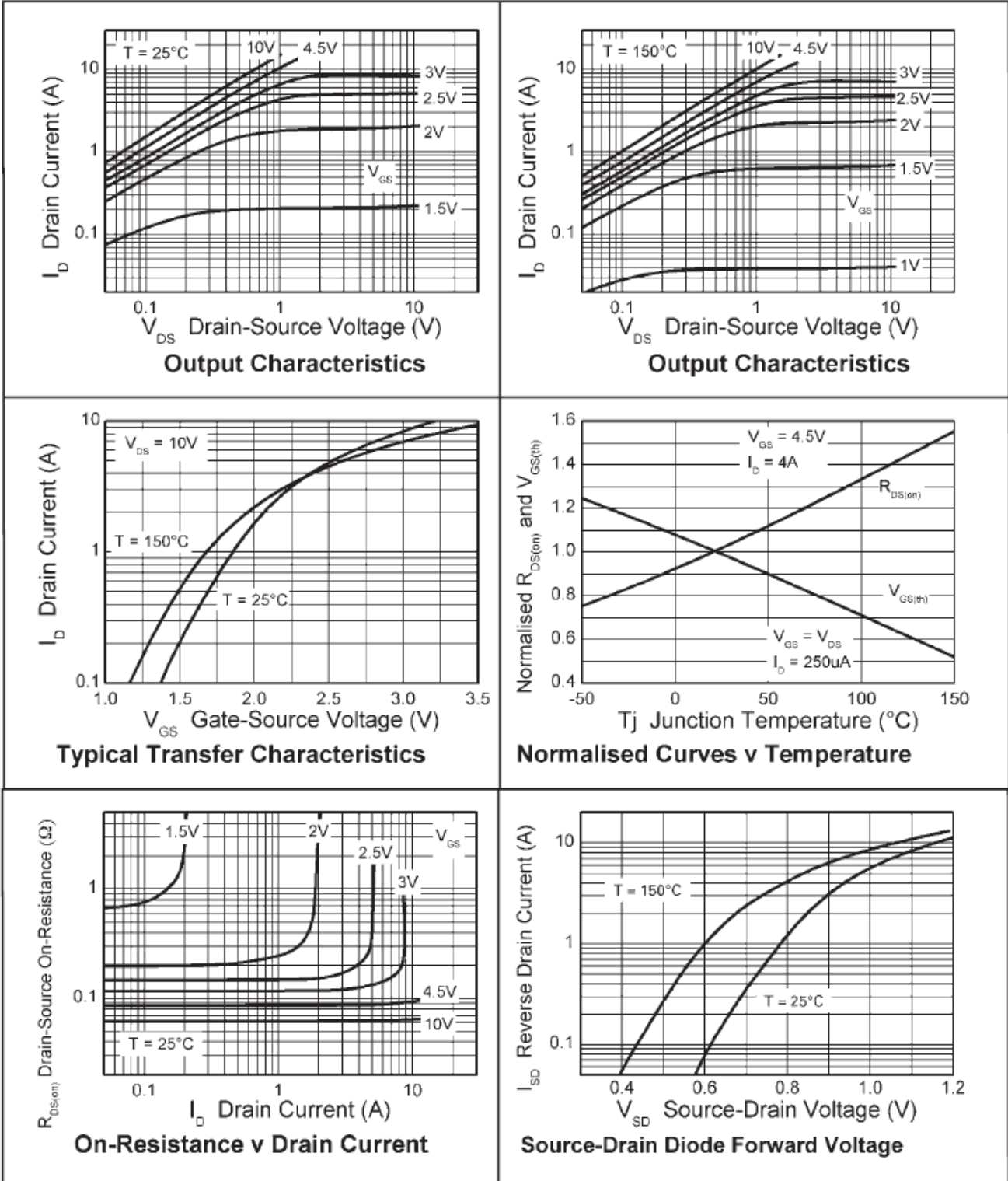
- Notes:
- For a device surface mounted on 25mm x 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  - For a device surface mounted on FR-4 PCB measured at  $t \leq 5$  secs.
  - Repetitive rating 25mm x 25mm FR4 PCB,  $D = 0.05$ , pulse width 10 $\mu\text{s}$  - pulse width limited by maximum junction temperature. Refer to Transient Thermal Impedance graph.

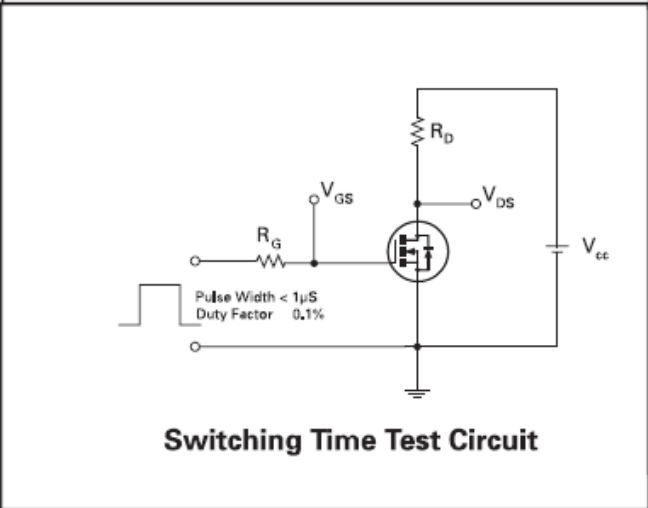
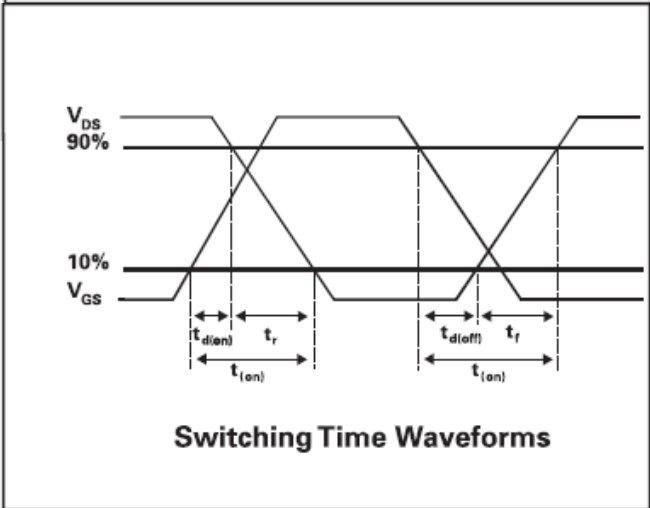
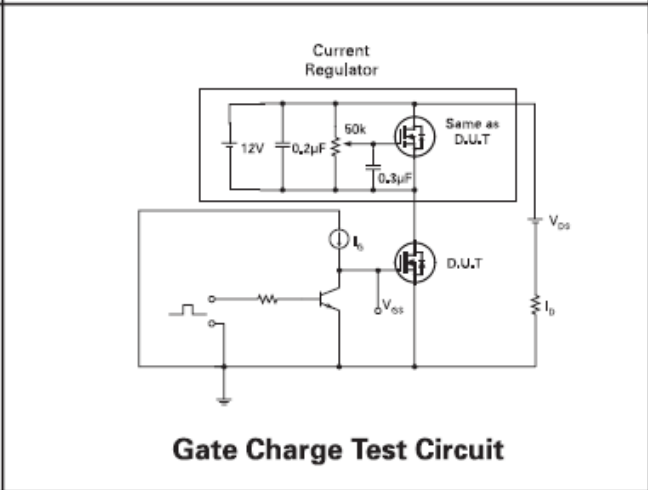
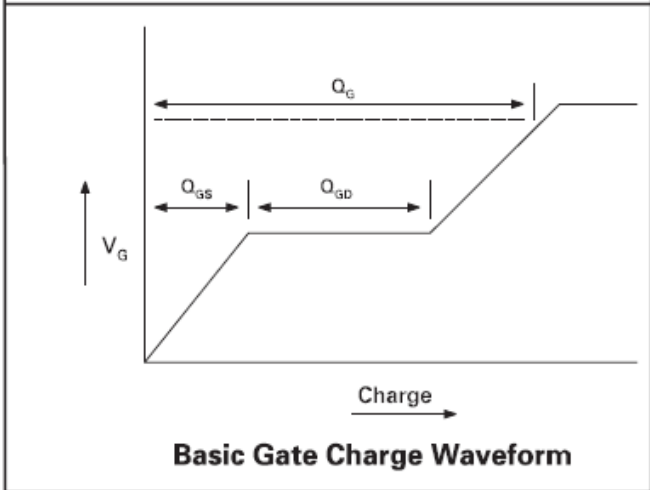
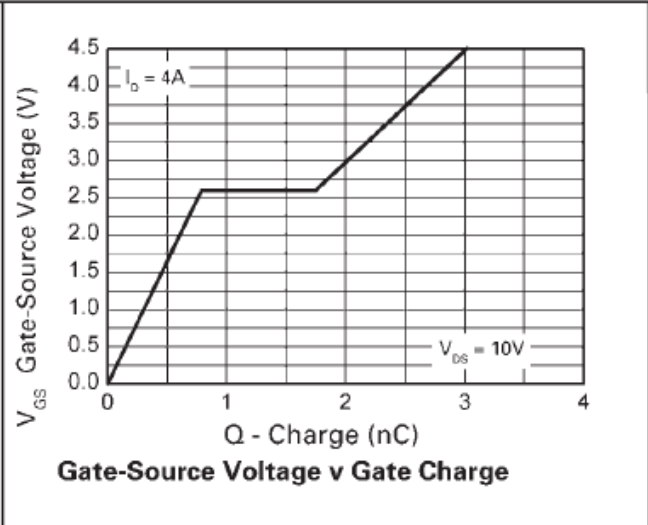
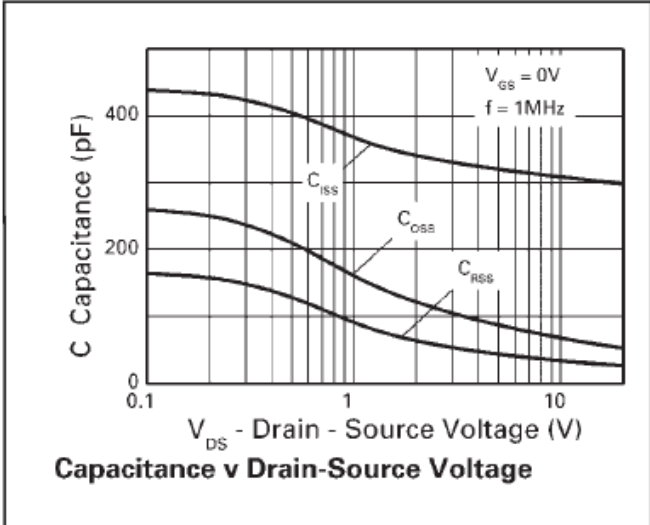


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

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

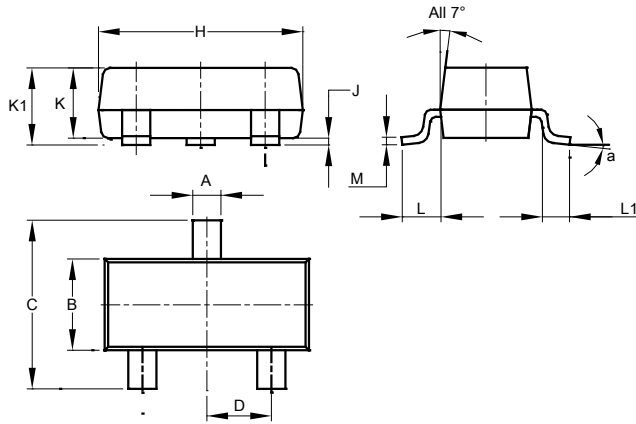
- Notes:
8. Measured under pulsed conditions. Width=300μs. Duty cycle ≤ 2%.
  9. Switching characteristics are independent of operating junction temperature.
  10. Guaranteed by design. Not subject to production testing.





**Package Outline Dimensions**

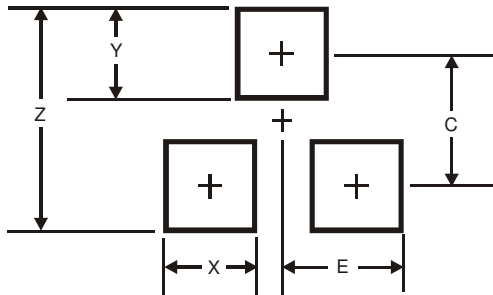
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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