

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$ $T_A = +25^\circ C$
40V	0.05Ω @ $V_{GS} = 10V$	7A

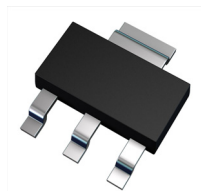
## Description

This new generation MOSFET has been 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.

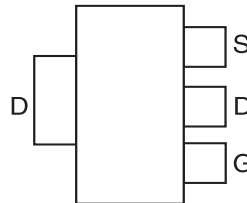
## Applications

- DC-DC Converters
- Audio Output Stages
- Relay and Solenoid driving
- Motor Control

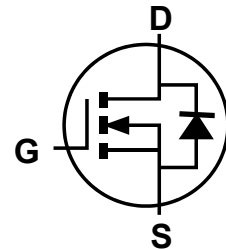
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

## Features

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

## Mechanical Data

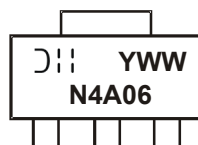
- Case: SOT223
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208 <sup>(e3)</sup>
- Weight: 0.112 grams (approximate)

## Ordering Information (Note 4 & 5)

Part Number	Compliance	Case	Packaging
ZXMN4A06GQTA	Automotive	SOT223	1,000/Tape & Reel
ZXMN4A06GQTC	Automotive	SOT223	4,000/Tape & Reel

- Note:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  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. 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. For more information, please refer to [http://www.diodes.com/quality/product\\_grade\\_definitions/](http://www.diodes.com/quality/product_grade_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



D = Manufacturer's Marking  
 N4A06 = Marking Code  
 YWW = Date Code Marking  
 Y = Year (ex: 3 = 2013)  
 WW = Week (01 - 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	40	V
Gate-Source Voltage			V <sub>GS</sub>	±20	V
Continuous Drain Current	V <sub>GS</sub> = 10V	(Note 7)	I <sub>D</sub>	7	A
		T <sub>A</sub> = +70°C (Note 7)		5.6	
		(Note 6)		5	
Pulsed Drain Current	V <sub>GS</sub> = 10V	(Note 8)	I <sub>DM</sub>	22	A
Continuous Source Current (Body diode)			I <sub>S</sub>	5.4	A
Pulsed Source Current (Body diode)			I <sub>SM</sub>	22	A

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

Characteristic		Symbol	Value	Unit	
Power Dissipation	(Note 6)	P <sub>D</sub>	2	W	
	(Note 7)		16		
Linear Derating Factor	(Note 6)	R <sub>θJA</sub>	3.9	mW/°C	
	(Note 7)		31		
Thermal Resistance, Junction to Ambient		R <sub>θJA</sub>	62.5	°C/W	
			32.2		
Operating and Storage Temperature Range			T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**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>	40	—	—	V	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	1	—	—	V	I <sub>D</sub> = 250μA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-Resistance (Note 9)	R <sub>DS(ON)</sub>	—	—	0.05	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 4.5A
				0.075		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.2A
Forward Transconductance (Notes 11)	g <sub>fs</sub>	—	8.7	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 2.5A
Diode Forward Voltage (Note 9)	V <sub>SD</sub>	—	0.8	0.95	V	I <sub>S</sub> = 2.5A, V <sub>GS</sub> = 0V, T <sub>J</sub> = +25°C
Reverse recovery time (Note 11)	t <sub>rr</sub>	—	14.5	—	ns	I <sub>F</sub> = 2.5A, di/dt = 100A/μs,
Reverse recovery charge (Note 11)	Q <sub>rr</sub>	—	7.8	—	nC	T <sub>J</sub> = +25°C
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>						
Input Capacitance	C <sub>iss</sub>	—	746	—	pF	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	93	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	60	—	pF	
Total Gate Charge (Note 11)	Q <sub>g</sub>	—	19	—	nC	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.5A (refer to test circuit)
Gate-Source Charge (Note 11)	Q <sub>gs</sub>	—	2.3	—	nC	
Gate-Drain Charge (Note 11)	Q <sub>gd</sub>	—	4.1	—	nC	
Turn-On Delay Time (Note 11)	t <sub>D(on)</sub>	—	3.4	—	ns	V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V I <sub>D</sub> = 2.5A, R <sub>G</sub> ≅ 6Ω (refer to test circuit)
Turn-On Rise Time (Note 11)	t <sub>r</sub>	—	2.8	—	ns	
Turn-Off Delay Time (Note 11)	t <sub>D(off)</sub>	—	20	—	ns	
Turn-Off Fall Time (Note 11)	t <sub>f</sub>	—	7.7	—	ns	

- 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 ≤ 5 secs.
  - Repetitive rating 25mm x 25mm FR4 PCB, D = 0.05, pulse width 10μs - pulse width limited by maximum junction temperature.
  - Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
  - Switching characteristics are independent of operating junction temperatures.
  - For design aid only, not subject to production testing.

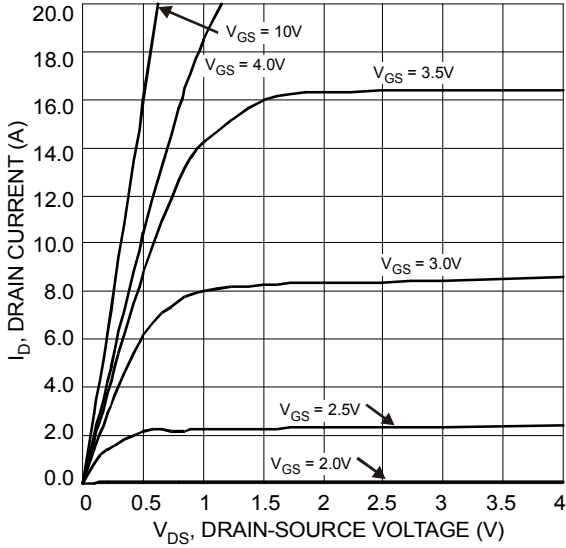


Figure 1 Typical Output Characteristic

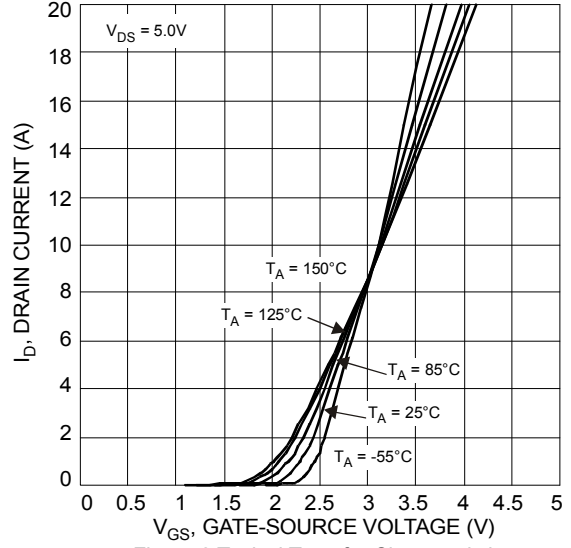


Figure 2 Typical Transfer Characteristics

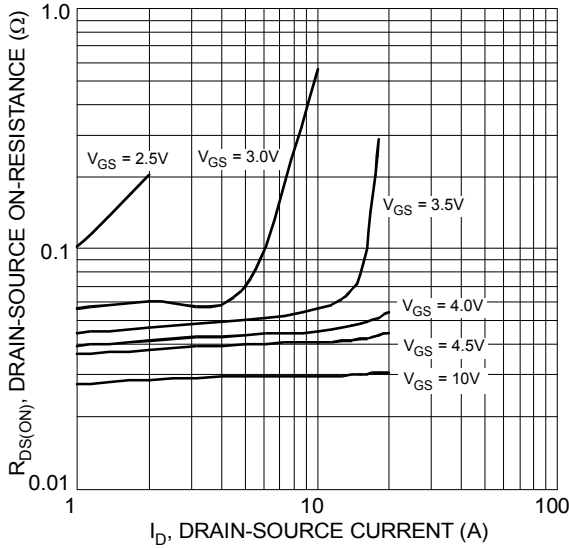


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

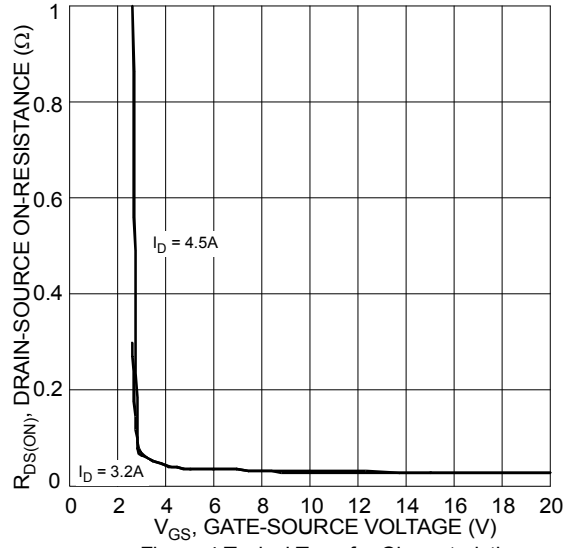


Figure 4 Typical Transfer Characteristic

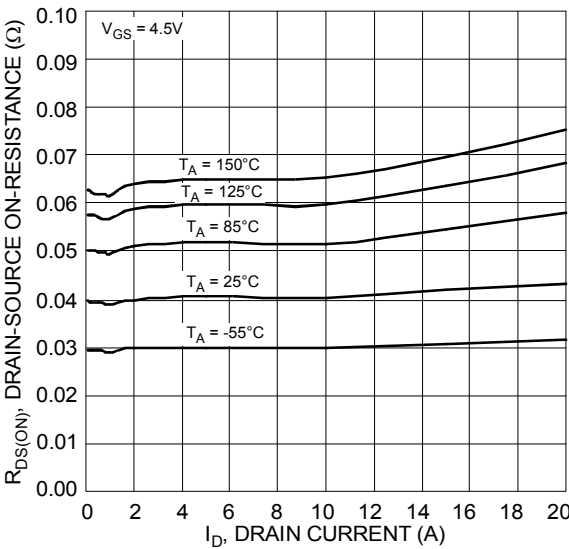


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

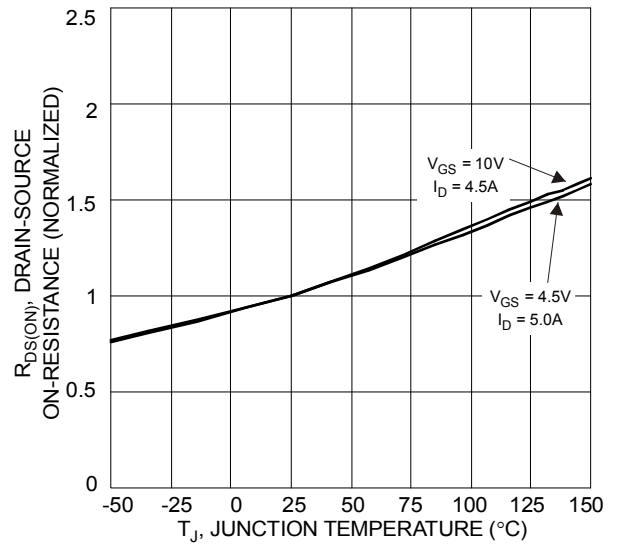


Figure 6 On-Resistance Variation with Temperature

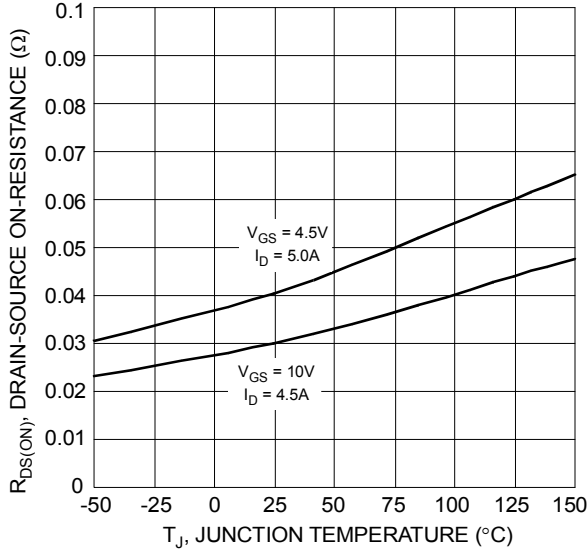


Figure 7 On-Resistance Variation with Temperature

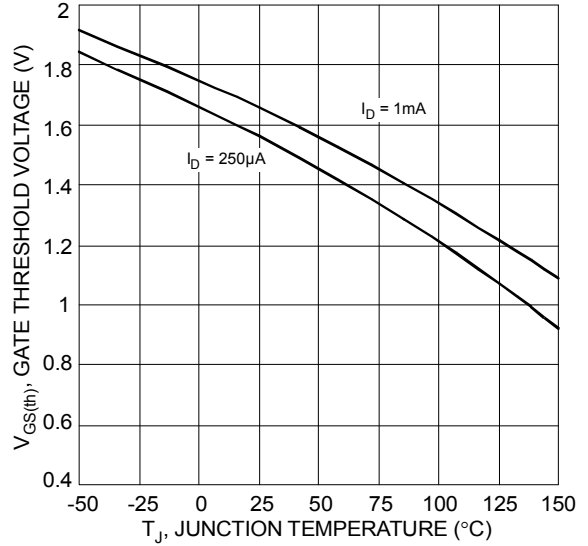


Figure 8 Gate Threshold Variation vs. Ambient Temperature

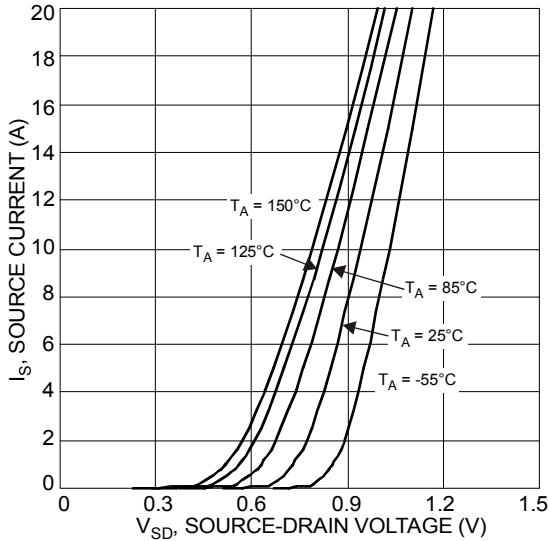


Figure 9 Diode Forward Voltage vs. Current

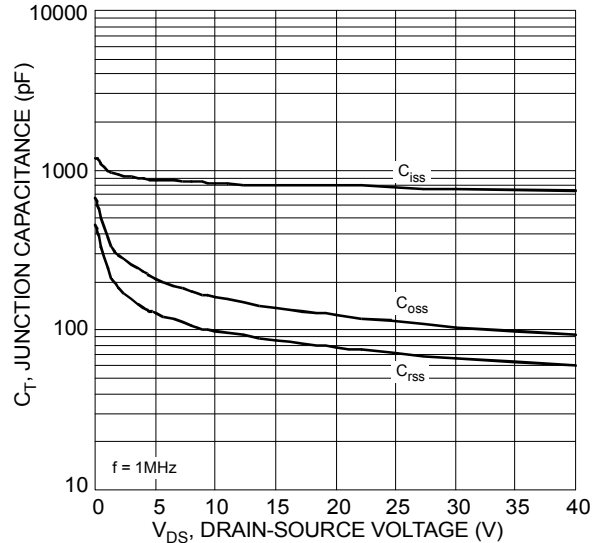


Figure 10 Typical Junction Capacitance

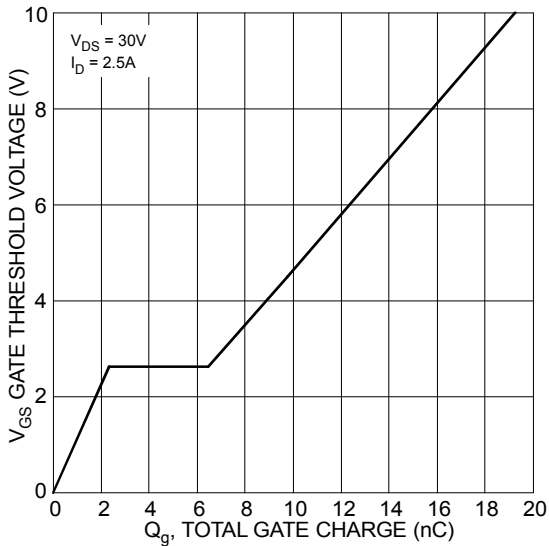


Figure 11 Gate Charge

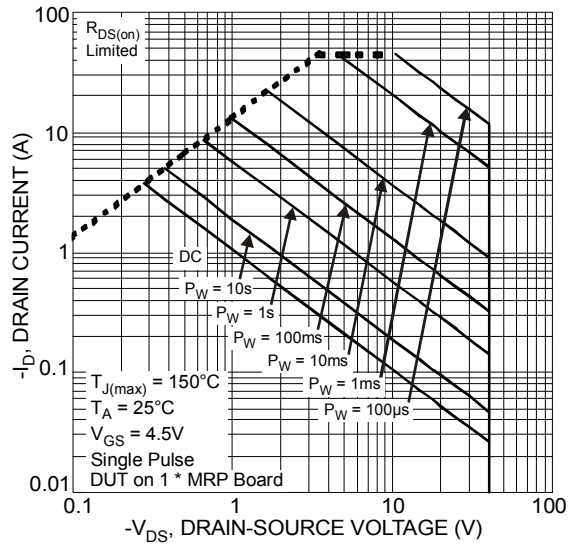


Figure 12 SOA, Safe Operation Area

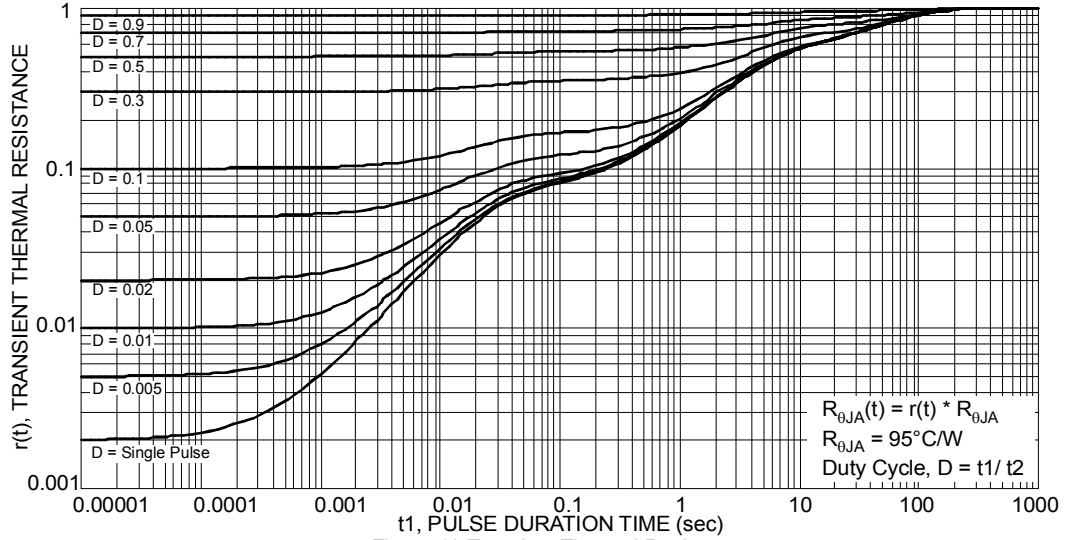
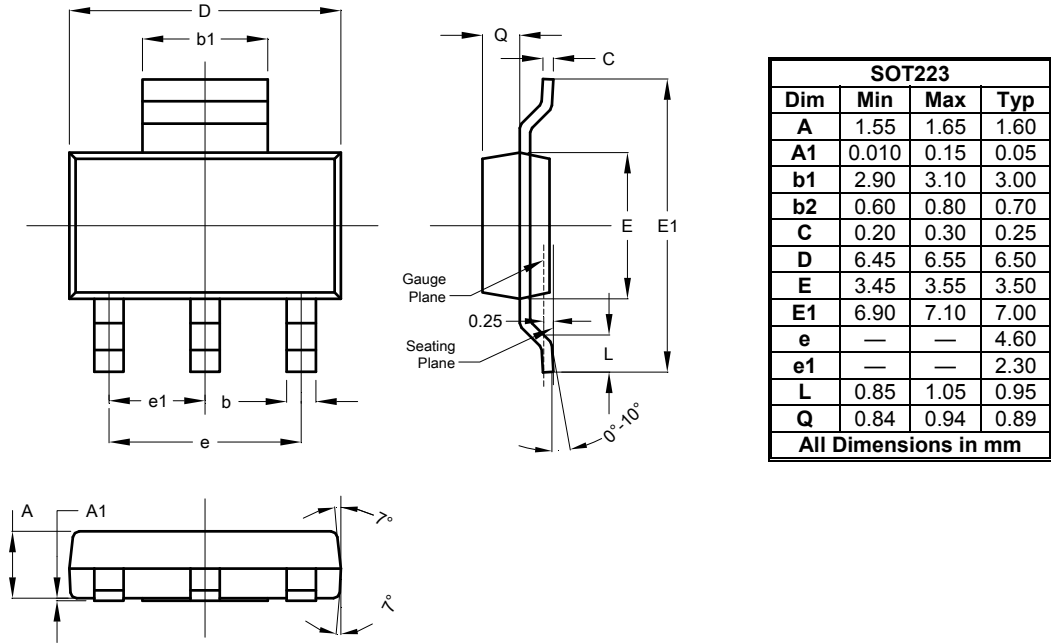


Figure 13 Transient Thermal Resistance

**Package Outline Dimensions**

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



**Suggested Pad Layout**

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



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