



**THE DATASHEET OF  
DMP2004TK-7**

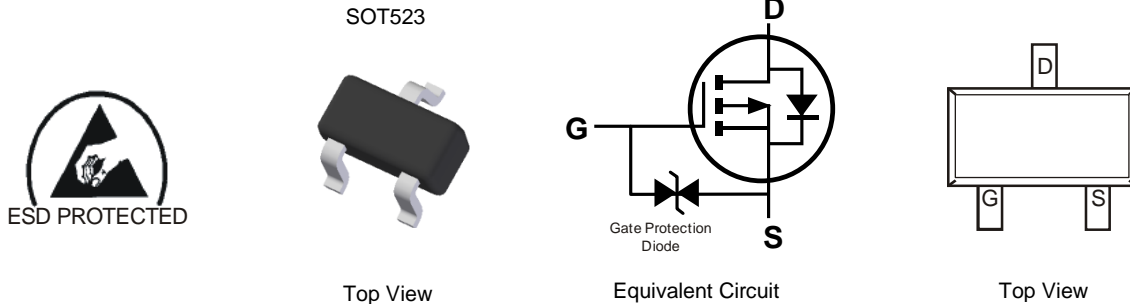


## Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected Gate**
- **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: SOT523
- 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 Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208 <sup>(e3)</sup>
- Terminal Connections: See Diagram
- Weight: 0.002 grams (Approximate)

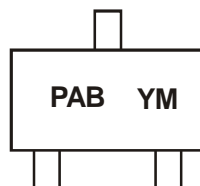


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2004TK-7	SOT523	3,000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



PAB = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: F = 2018)  
 M = Month (ex: 9 = September)

### Date Code Key

<b>Year Code</b>	2006 T	2007 U	...	2014 B	2015 C	2016 D	2017 E	2018 F	2019 G	2020 H	2021 I	2022 J
<b>Month Code</b>	Jan 1	Feb 2	Mar 3	Apr 4	May 5	Jun 6	Jul 7	Aug 8	Sep 9	Oct O	Nov N	Dec D

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	-20	V
Gate-Source Voltage			V <sub>GSS</sub>	±8	V
Drain Current (Note 5)	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	-430	mA
		T <sub>A</sub> = +85°C		-310	
Pulsed Drain Current (Note 6)			I <sub>DM</sub>	-750	mA

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P <sub>D</sub>	230	mW
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	558	°C/W
Total Power Dissipation (Note 6)		P <sub>D</sub>	320	mW
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	393	°C/W
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 (Note 7)</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>	—	—	-1.0	μA	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±1.0	μA	V <sub>GS</sub> = ±4.5V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-0.5	—	-1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	0.7	1.1	Ω	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -430mA
		—	1.0	1.6		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -300mA
		—	1.3	2.4		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -150mA
Diode Forward Voltage	V <sub>SD</sub>	—	-0.8	-1.4	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -115mA
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	47	—	pF	V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	6.8	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	4.9	—	pF	
Gate Resistance	R <sub>g</sub>	—	240	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V
Total Gate Charge V <sub>GS</sub> = -4.5V	Q <sub>g</sub>	—	0.55	—	nC	V <sub>DS</sub> = -10V, I <sub>D</sub> = -250mA
Total Gate Charge V <sub>GS</sub> = -8V	Q <sub>g</sub>	—	0.97	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	0.05	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	0.1	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	5.9	—	ns	V <sub>DD</sub> = -3V, V <sub>GS</sub> = -2.5V, R <sub>G</sub> = 25Ω, I <sub>D</sub> = -100mA
Turn-On Rise Time	t <sub>r</sub>	—	3.3	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	25.5	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	19.3	—	ns	
Reverse Recovery Time	t <sub>RR</sub>	—	7.3	—	ns	I <sub>F</sub> = -1A, di/dt = -100A/μs
Reverse Recovery Charge	Q <sub>RR</sub>	—	1.9	—	nC	I <sub>F</sub> = -1A, di/dt = -100A/μs

- Notes:
5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
  6. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
  7. Short duration pulse test used to minimize self-heating effect.
  8. Guaranteed by design. Not subject to product testing.

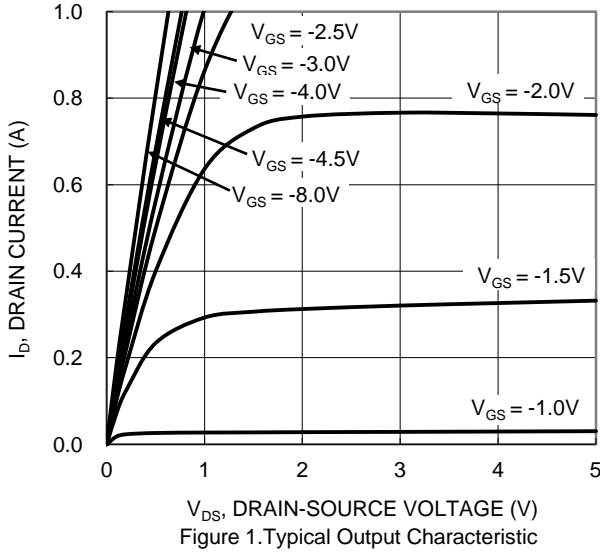


Figure 1. Typical Output Characteristic

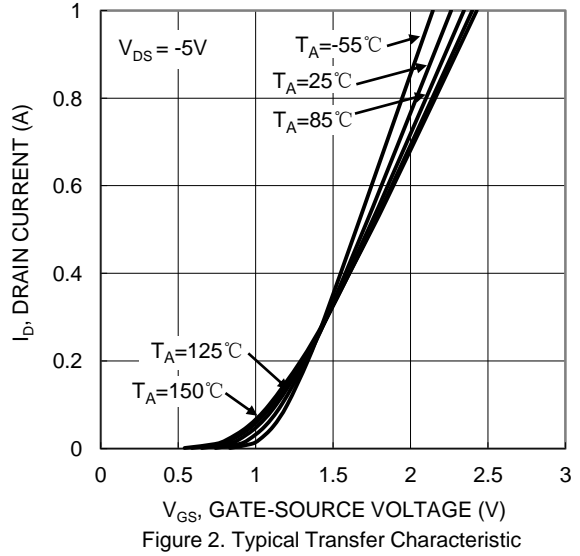


Figure 2. Typical Transfer Characteristic

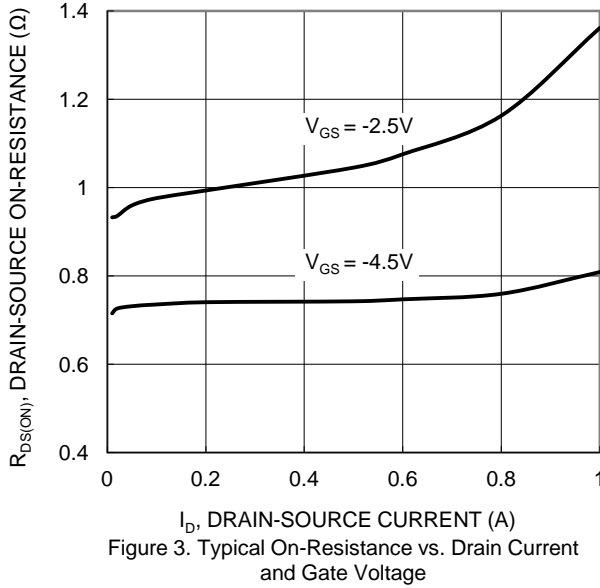


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

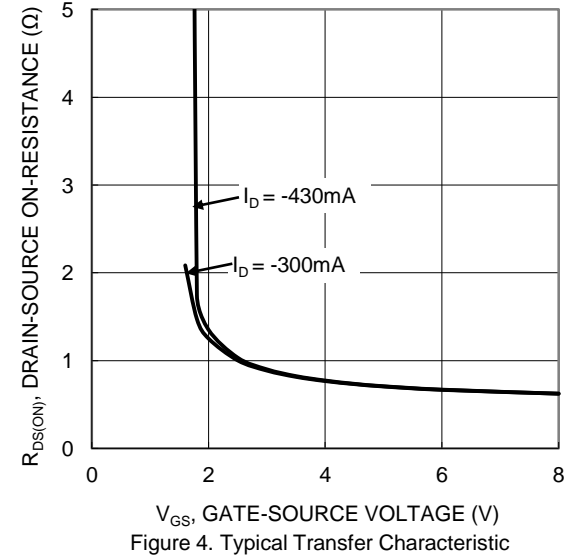


Figure 4. Typical Transfer Characteristic

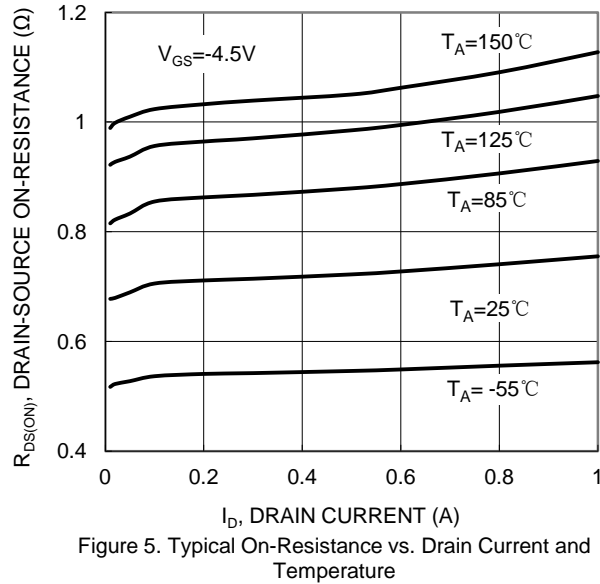


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

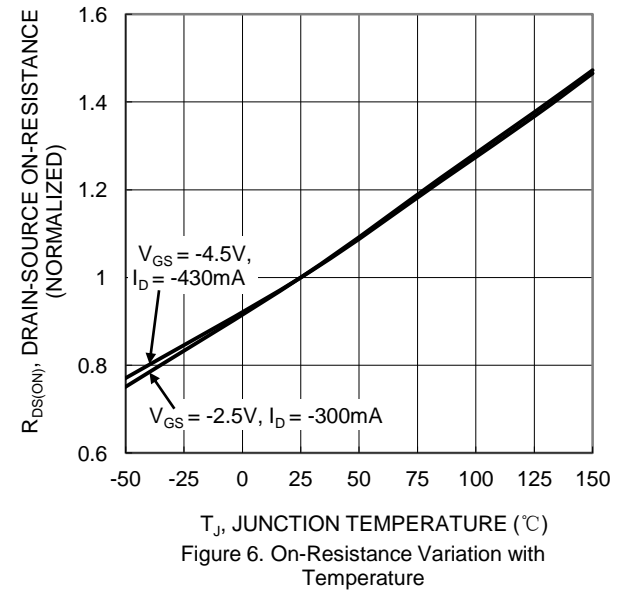
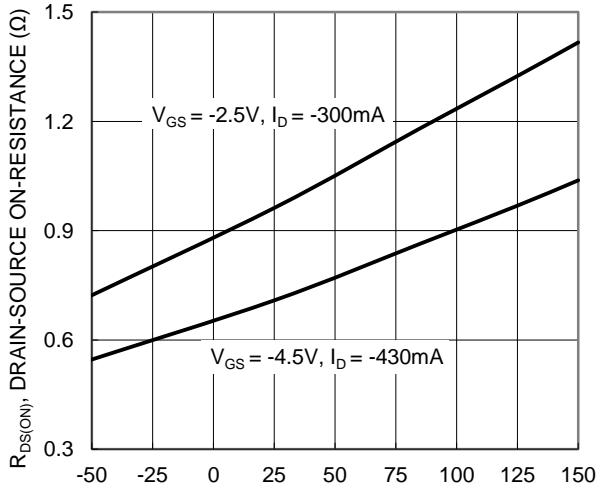
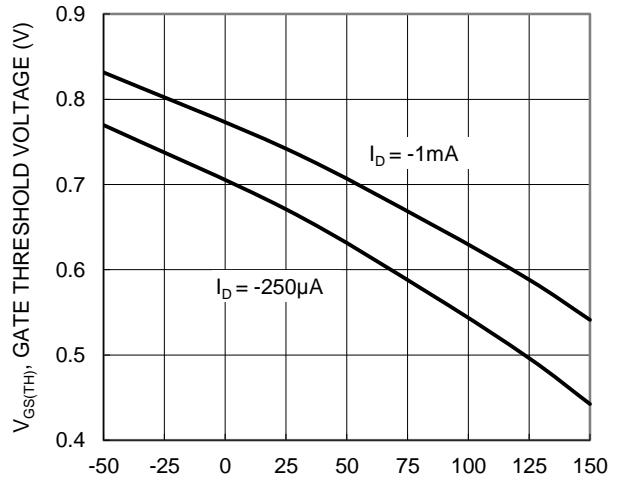


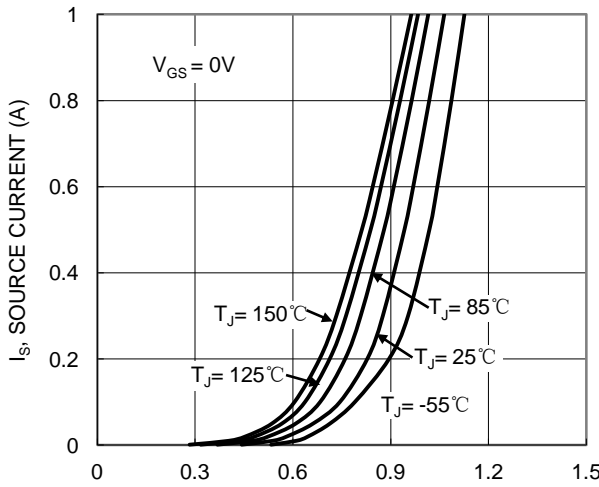
Figure 6. On-Resistance Variation with Temperature



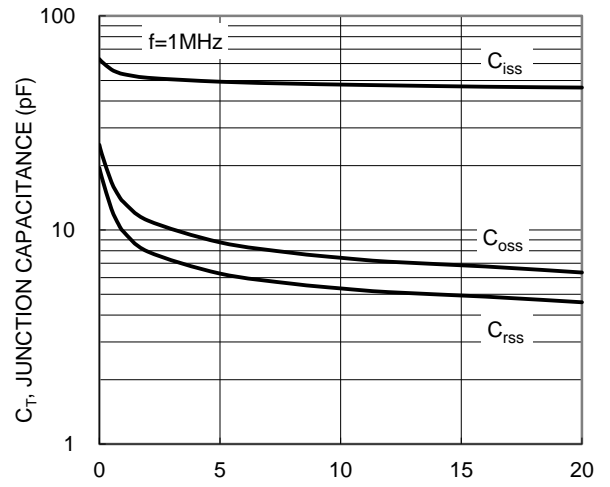
T<sub>J</sub>, JUNCTION TEMPERATURE (°C)  
Figure 7. On-Resistance Variation with Temperature



T<sub>J</sub>, JUNCTION TEMPERATURE (°C)  
Figure 8. Gate Threshold Variation vs. Junction Temperature



V<sub>SD</sub>, SOURCE-DRAIN VOLTAGE (V)  
Figure 9. Diode Forward Voltage vs. Current



V<sub>DS</sub>, DRAIN-SOURCE VOLTAGE (V)  
Figure 10. Typical Junction Capacitance

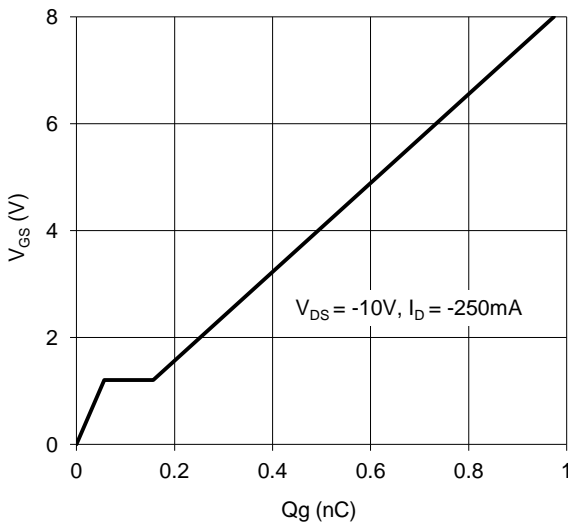
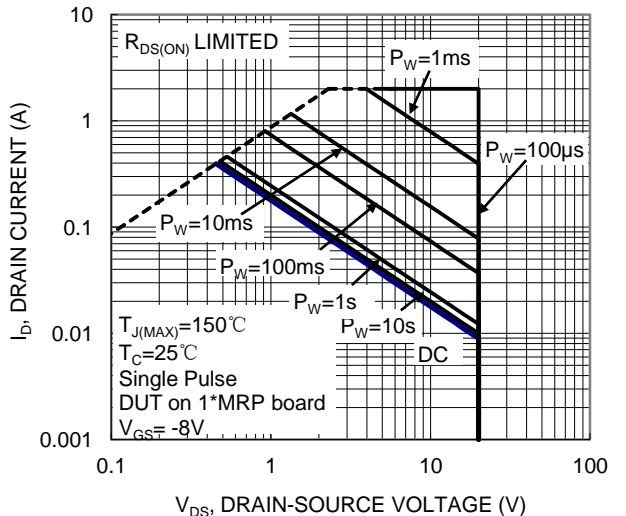


Figure 11. Gate Charge



V<sub>DS</sub>, DRAIN-SOURCE VOLTAGE (V)  
Figure 12. SOA, Safe Operation Area

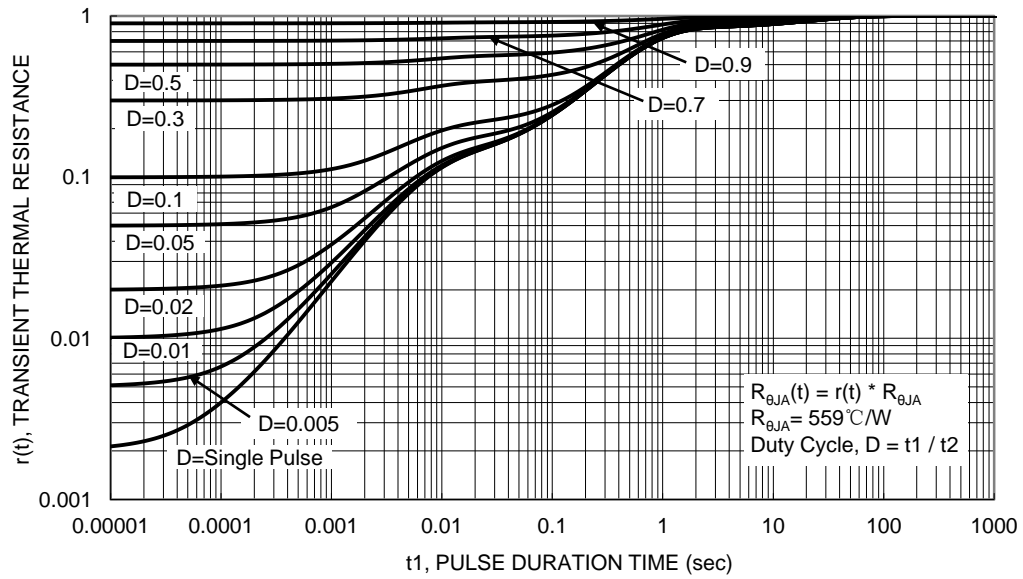
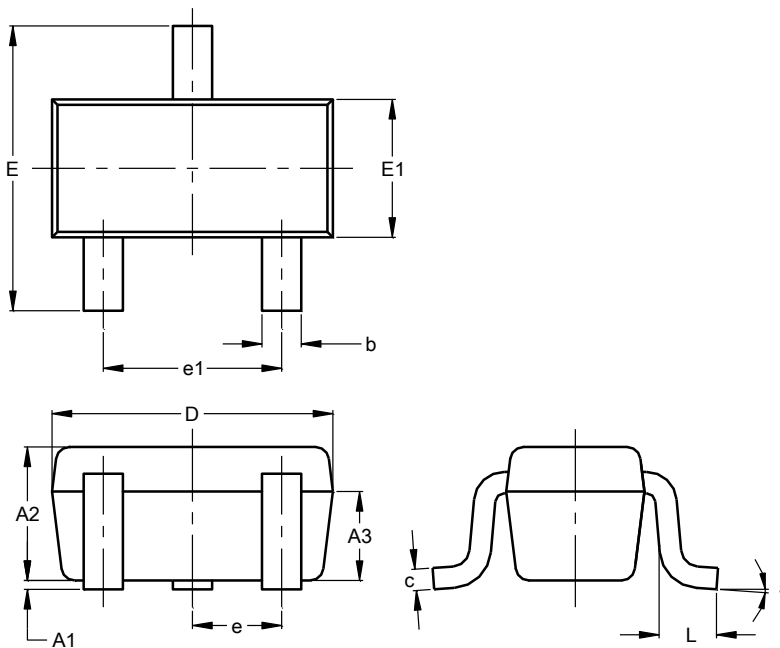


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

### SOT523



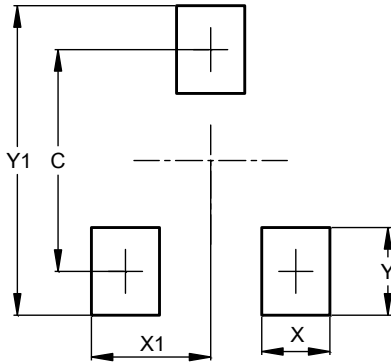
SOT523			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°

**All Dimensions in mm**

## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

### SOT523



Dimensions	Value (in mm)
C	1.29
X	0.40
X1	0.70
Y	0.51
Y1	1.80

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