

# DMP510DLW-7 Datasheet



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DiGi Electronics Part Number	DMP510DLW-7-DG
Manufacturer	<a href="#">Diodes Incorporated</a>
Manufacturer Product Number	DMP510DLW-7
Description	MOSFET BVDSS: 41V-60V SOT323 T&R
Detailed Description	P-Channel 50 V 174mA (Ta) 320mW (Ta) Surface Mount SOT-323



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## Purchase and inquiry

Manufacturer Product Number:

DMP510DLW-7

Series:

-

FET Type:

P-Channel

Drain to Source Voltage (Vdss):

50 V

Drive Voltage (Max Rds On, Min Rds On):

±20V

Vgs(th) (Max) @ Id:

2V @ 1mA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Supplier Device Package:

SOT-323

Base Product Number:

DMP510

Manufacturer:

Diodes Incorporated

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

174mA (Ta)

Rds On (Max) @ Id, Vgs:

100ohm @ 100mA, 5V

Gate Charge (Qg) (Max) @ Vgs:

0.56 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

24.6 pF @ 25 V

Power Dissipation (Max):

320mW (Ta)

Mounting Type:

Surface Mount

Package / Case:

SC-70, SOT-323

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.21.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99



**DMP510DLW****50V P-CHANNEL ENHANCEMENT MODE MOSFET****Product Summary**

$BV_{DSS}$	$R_{DS(ON)}$ Max	$I_D$ Max $T_A = +25^\circ C$
-50V	10.0Ω @ $V_{GS} = -5V$	-174mA

**Description and Applications**

This 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.

- Motor Control
- Power Management Functions
- Backlighting

**Features and Benefits**

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

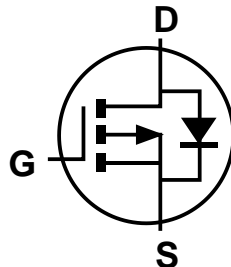
**Mechanical Data**

- Case: SOT323
- 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 (e3)
- Weight: 0.006 grams (Approximate)

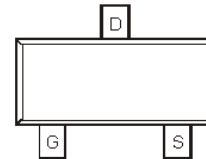
SOT323



Top View



Equivalent Circuit

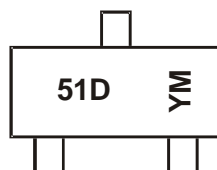


Top View

**Ordering Information** (Note 4)

Part Number	Case	Packaging
DMP510DLW-7	SOT323	3000/Tape & Reel
DMP510DLW-13	SOT323	10000/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**

51D= Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: H = 2020)  
 M = Month (ex: 9 = September)

## Date Code Key

Year	2017	...	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Code	E	...	H	I	J	K	L	M	N	O	P	R

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



DMP510DLW

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

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V <sub>DSS</sub>	-50	V	
Gate-Source Voltage	V <sub>GSS</sub>	±20	V	
Continuous Drain Current (Note 6) V <sub>GS</sub> = -5V	I <sub>D</sub>	T <sub>A</sub> = +25°C	-174	mA
		T <sub>A</sub> = +70°C	-139	
Maximum Continuous Body Diode Forward Current (Note 6)	I <sub>S</sub>	-65	mA	
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%) (Note 6)	I <sub>DM</sub>	-1.0	A	

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P <sub>D</sub>	320	mW
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	398	°C/W
Total Power Dissipation (Note 6)	P <sub>D</sub>	470	mW
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	273	°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>	-50	—	—	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> = -50V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-0.8	—	-2.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -1mA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	—	10	Ω	V <sub>GS</sub> = -5V, I <sub>D</sub> = -0.1A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.78	-1.5	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -100mA
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iSS</sub>	—	24.6	—	pF	V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	4.8	—	pF	
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	2.8	—	pF	
Gate Resistance	R <sub>g</sub>	—	2000	—	Ω	f = 1.0MHz, V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V
Total Gate Charge (V <sub>GS</sub> = -4.5V)	Q <sub>g</sub>	—	280	—	pC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -100mA
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>g</sub>	—	560	—	pC	
Gate-Source Charge	Q <sub>gs</sub>	—	90	—	pC	
Gate-Drain Charge	Q <sub>gd</sub>	—	77	—	pC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	2.8	—	ns	V <sub>DD</sub> = -30V, I <sub>D</sub> = -0.27A, R <sub>GEN</sub> = 50Ω, V <sub>GS</sub> = -10V
Turn-On Rise Time	t <sub>R</sub>	—	2.6	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	11.1	—	ns	
Turn-Off Fall Time	t <sub>F</sub>	—	7.2	—	ns	

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



**DMP510DLW**

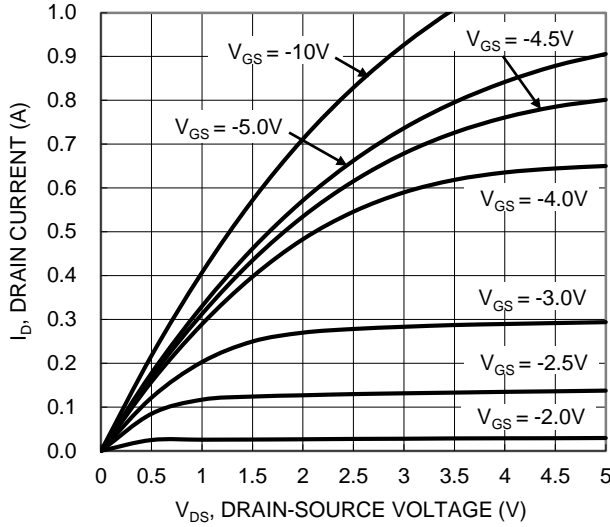


Figure 1. Typical Output Characteristic

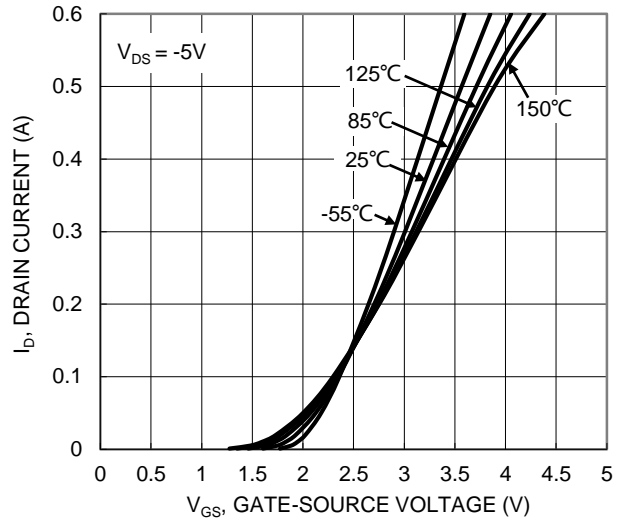


Figure 2. Typical Transfer Characteristic

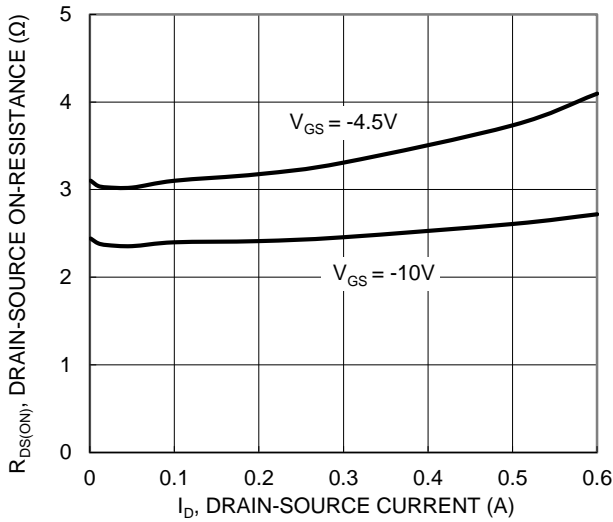


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

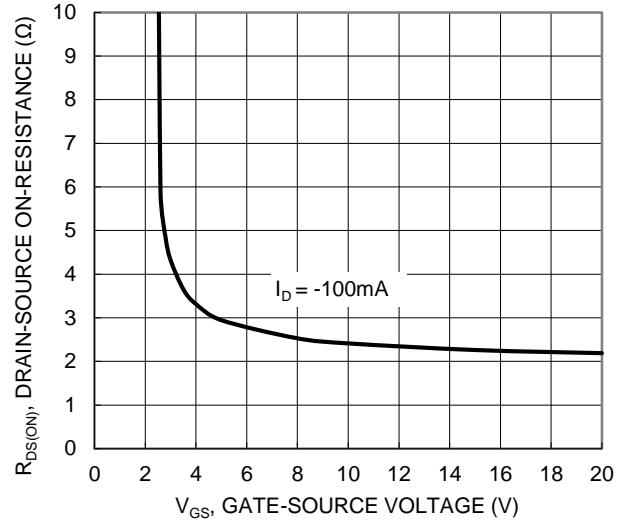


Figure 4. Typical Transfer Characteristic

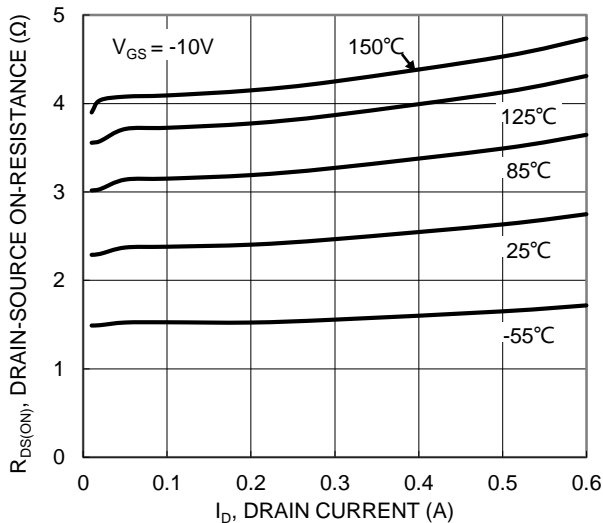


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

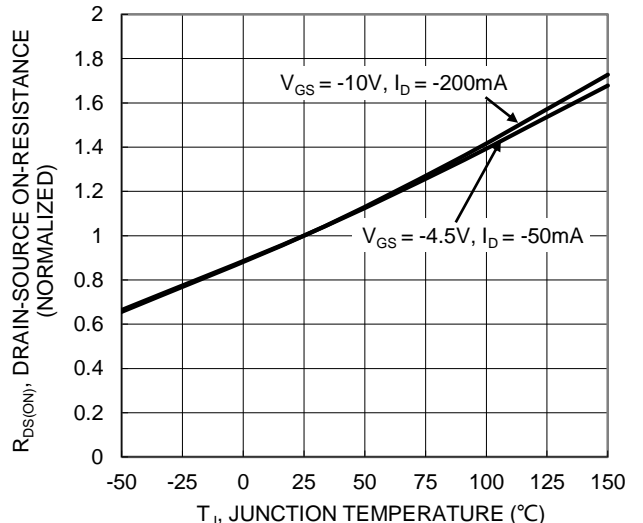


Figure 6. On-Resistance Variation with Temperature



**DMP510DLW**

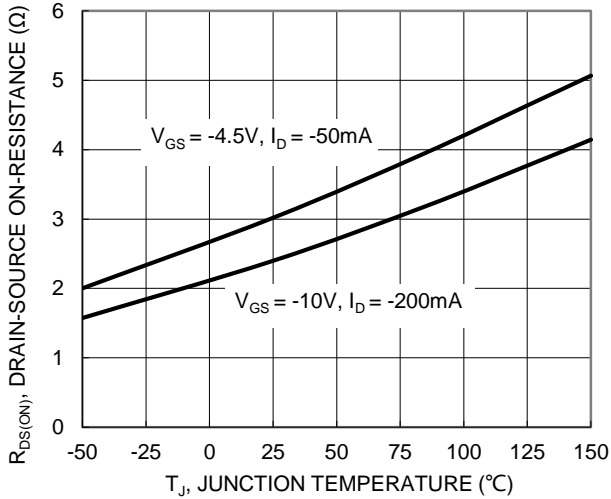


Figure 7. On-Resistance Variation with Temperature

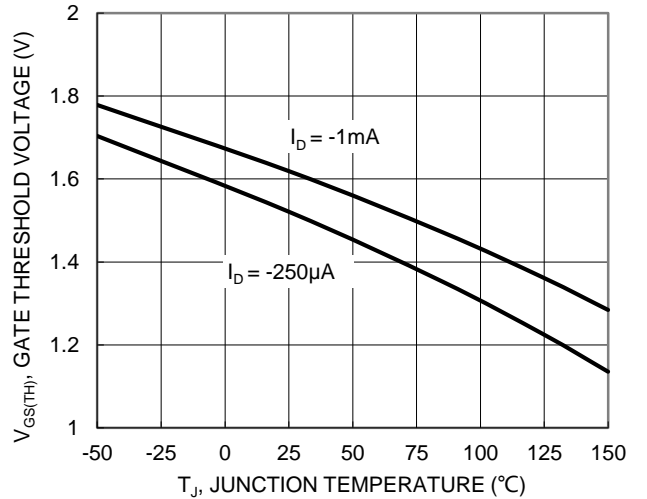


Figure 8. Gate Threshold Variation vs. Junction Temperature

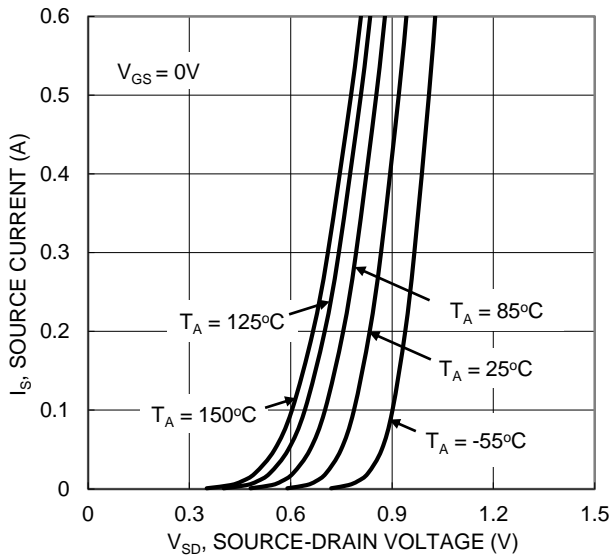


Figure 9. Diode Forward Voltage vs. Current

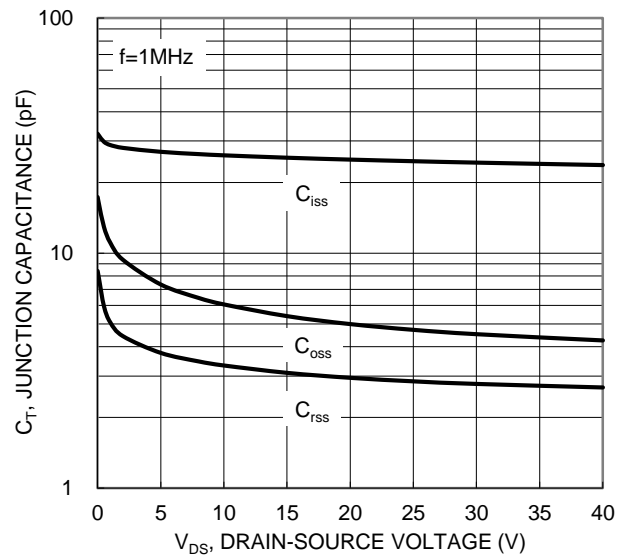


Figure 10. Typical Junction Capacitance

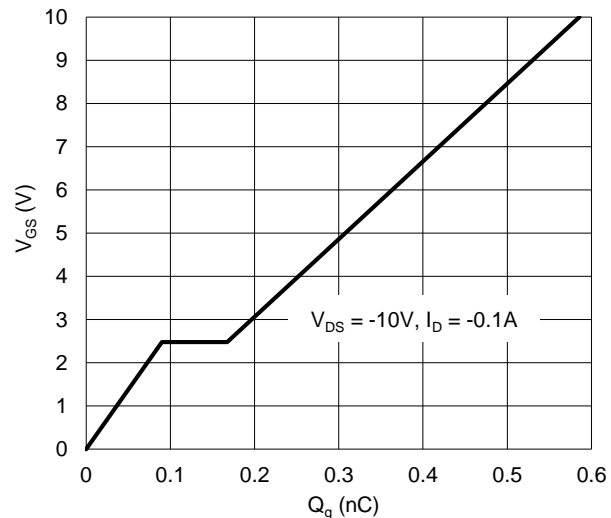


Figure 11. Gate Charge



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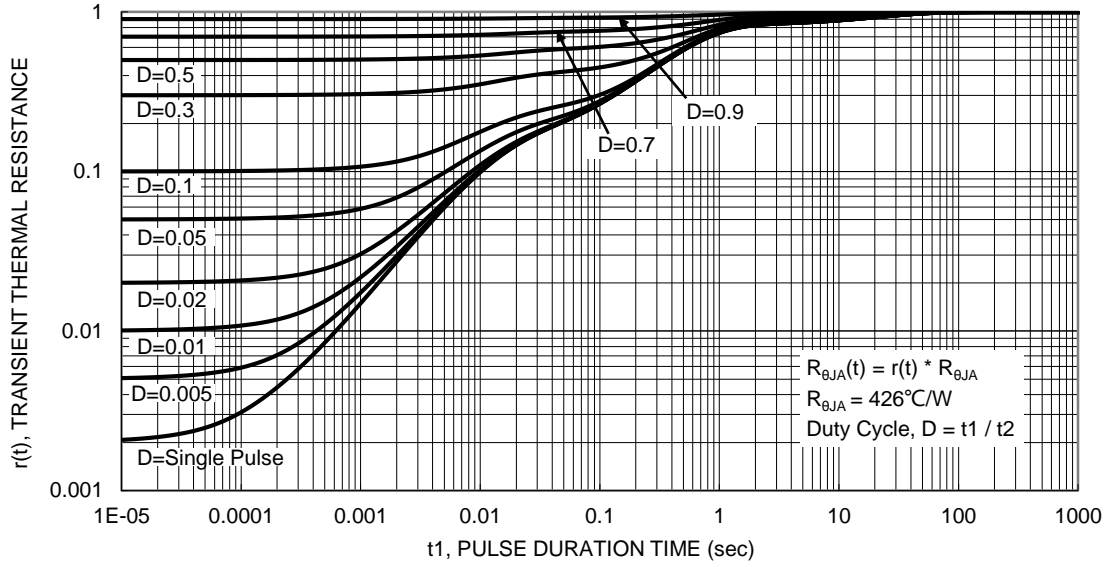
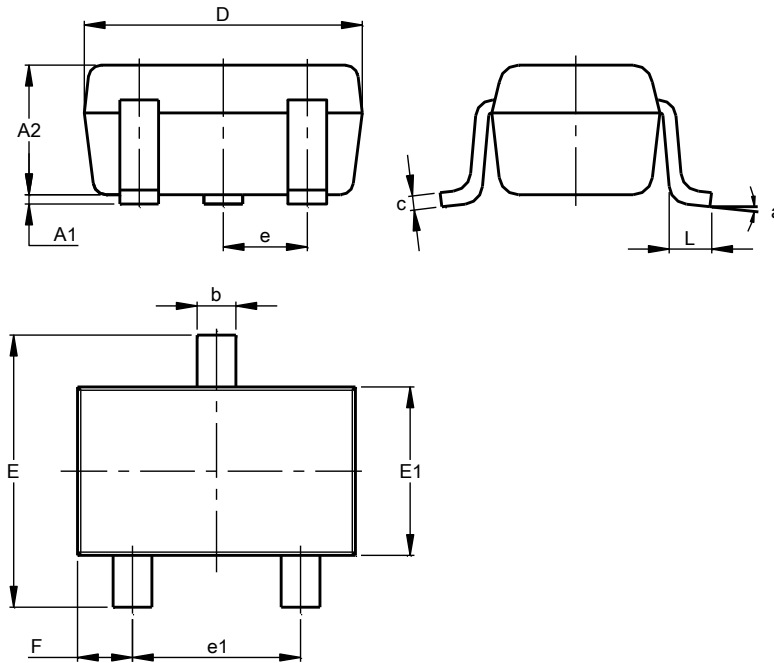


Figure 12. Transient Thermal Resistance

## Package Outline Dimensions

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

SOT323

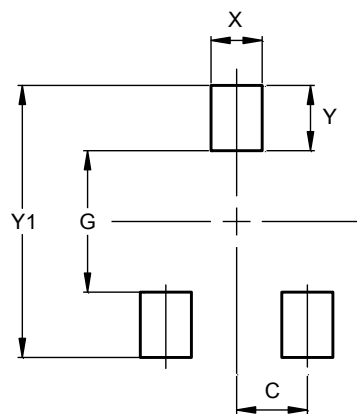


SOT323			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.25	0.40	0.30
c	0.10	0.18	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
e1	1.20	1.40	1.30
F	0.375	0.475	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

## Suggested Pad Layout

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

SOT323



Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.470
Y	0.600
Y1	2.500





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