

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>A</sub> = +25°C
50V	2.0Ω @ V <sub>GS</sub> = 5V	350mA
	2.5Ω @ V <sub>GS</sub> = 2.5V	320mA
	4.0Ω @ V <sub>GS</sub> = 1.8V	270mA

## Description and Applications

This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

- Motor driving
- Power management functions
- Load switching

## Features and Benefits

- Low On-Resistance
- Very 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)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, 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

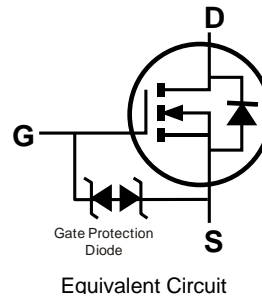
- Package: SOT523
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Alloy 42 Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Terminal Connections: See Diagram
- Weight: 0.002 grams (Approximate)



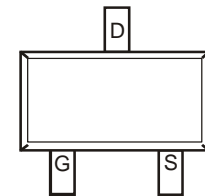
SOT523



Top View



Equivalent Circuit

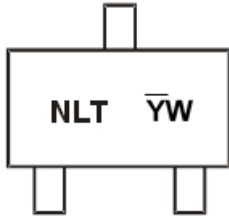

 Top View  
Pin-Out

## Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMN52D0LT-7	SOT523	3000	Tape & Reel
DMN52D0LT-13	SOT523	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



NLT = Product Type Marking Code  
 YW = Date Code Marking  
 Y = Year (ex: 2 = 2022)  
 W = Week (ex: a = week 27; z represents week 52 and 53)

### Date Code Key

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Code	2	3	4	5	6	7	8	9	0	1	2	3
Week	1-26				27-52				53			
Code	A-Z				a-z				z			

## 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>	±12	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 5V	I <sub>D</sub>	Steady State	350
		T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	280
Maximum Continuous Body Diode Forward Current (Note 5)	I <sub>S</sub>	350	mA
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	1.2	A
Pulsed Source Current (10µs Pulse, Duty Cycle = 1%)	I <sub>SM</sub>	1.2	A

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P <sub>D</sub>	0.4	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	300	°C/W
Total Power Dissipation (Note 5)	P <sub>D</sub>	0.5	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	246	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.  
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.

**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> = 10μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V
Gate-Body Leakage	I <sub>GSS</sub>	—	—	10	μA	V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.49	—	1.2	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	0.97	2.0	Ω	V <sub>GS</sub> = 5.0V, I <sub>D</sub> = 50mA
		—	1.2	2.5		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 50mA
		—	1.6	4.0		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 50mA
Source-Drain Diode Forward Voltage	V <sub>SD</sub>	—	0.6	1.4	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 50mA
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	40	—	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	5.6	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	4.3	—	pF	
Gate Resistance	R <sub>g</sub>	—	52	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	0.8	—	nC	V <sub>DS</sub> = 25V, I <sub>D</sub> = 50mA
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	1.5	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	0.1	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	0.2	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	1.3	—	ns	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 10V R <sub>g</sub> = 50Ω, I <sub>D</sub> = 50mA
Turn-On Rise Time	t <sub>R</sub>	—	9.6	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	32	—	ns	
Turn-Off Fall Time	t <sub>F</sub>	—	41	—	ns	

Notes: 7. Short duration pulse test used to minimize self-heating effect.  
8. Guaranteed by design. Not subject to product testing.

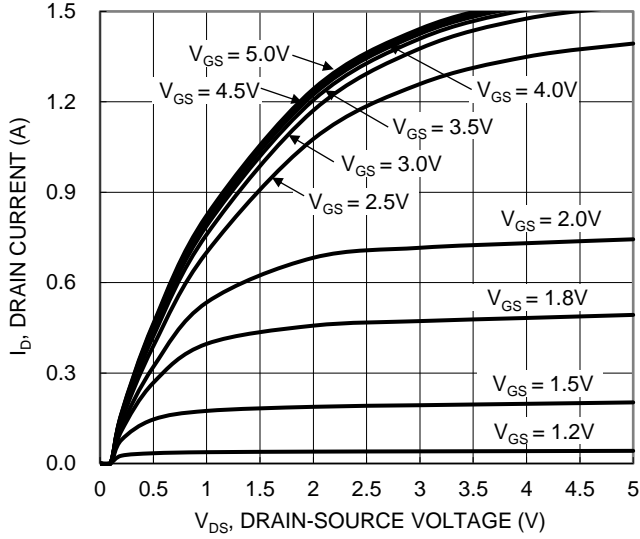


Figure 1. Typical Output Characteristic

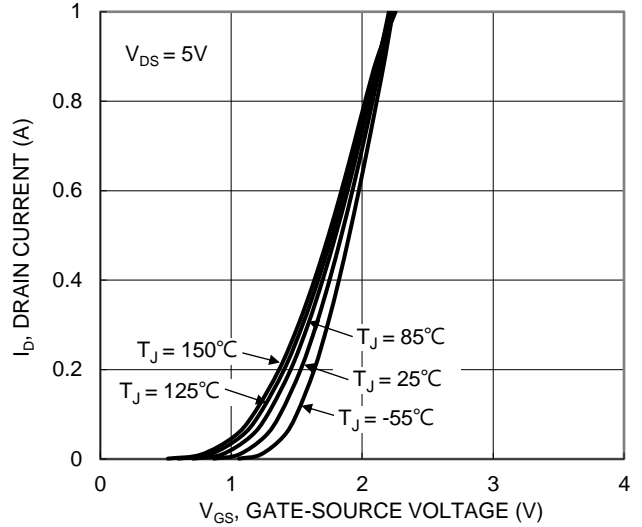


Figure 2. Typical Transfer Characteristic

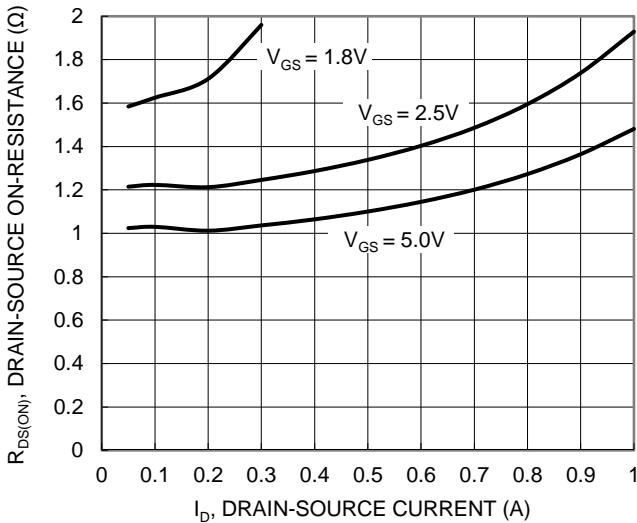


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

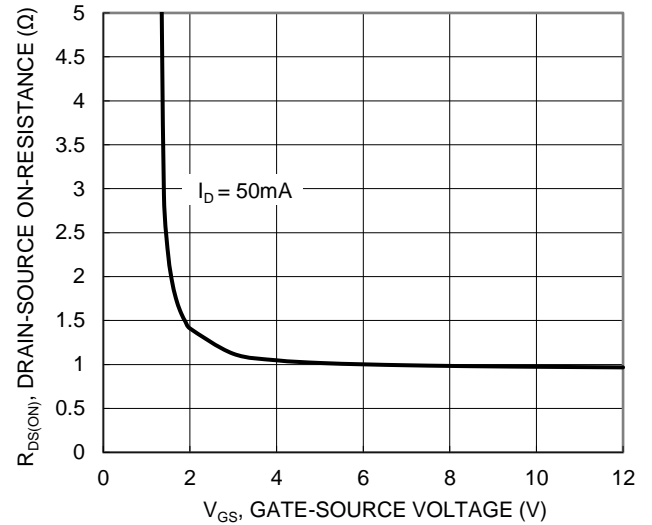


Figure 4. Typical Transfer Characteristic

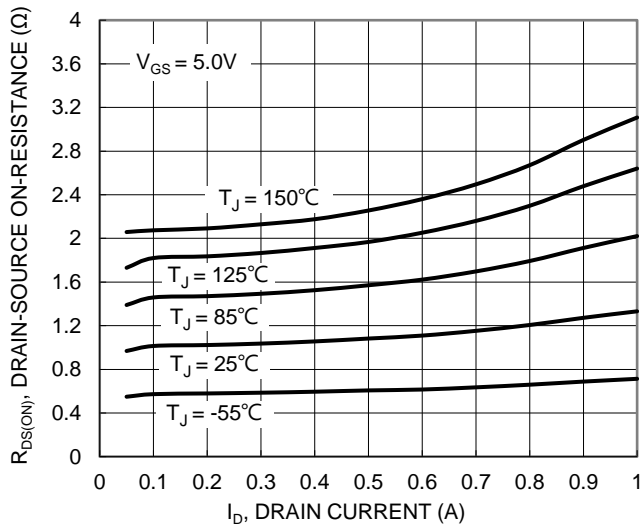


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

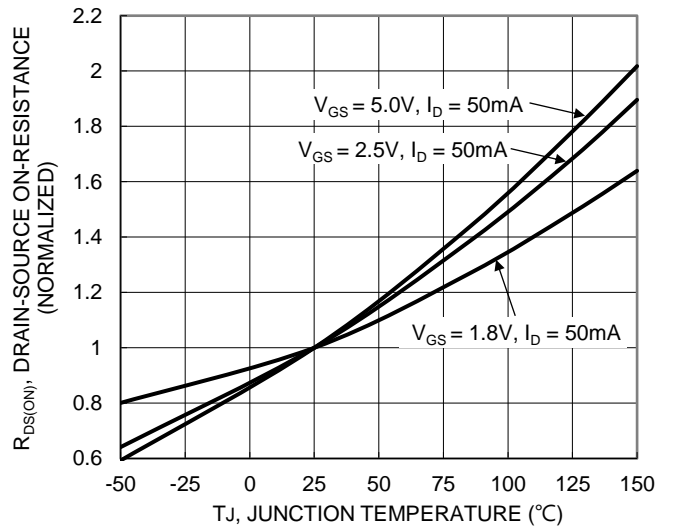


Figure 6. On-Resistance Variation with Junction Temperature

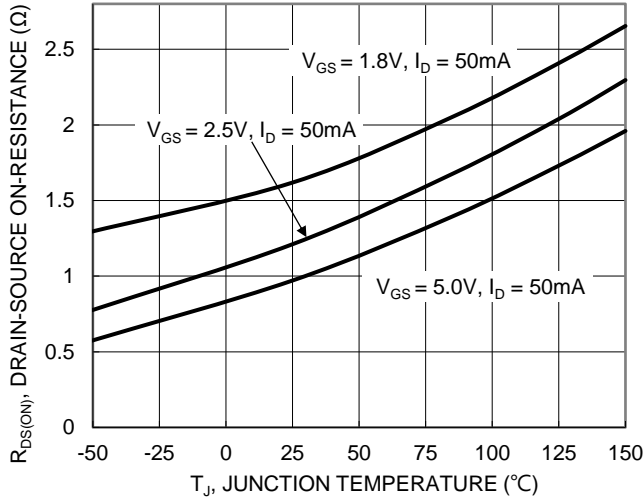


Figure 7. On-Resistance Variation with Junction Temperature

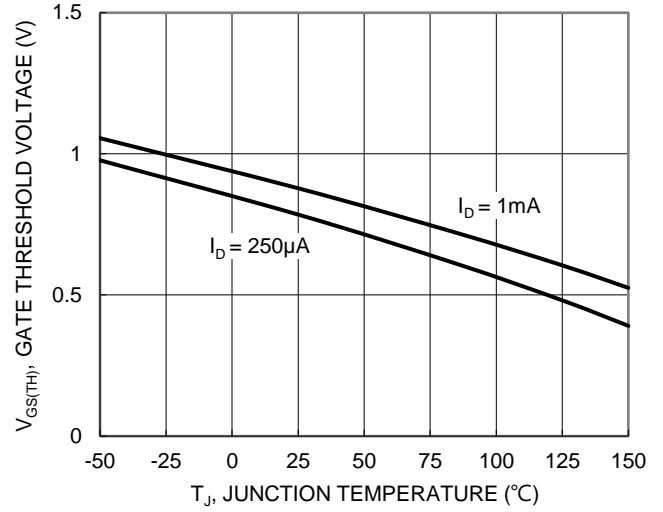


Figure 8. Gate Threshold Variation vs Junction Temperature

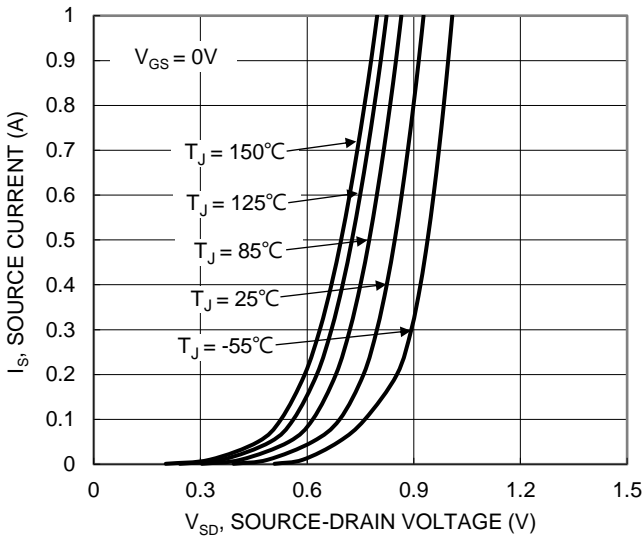


Figure 9. Diode Forward Voltage vs. Current

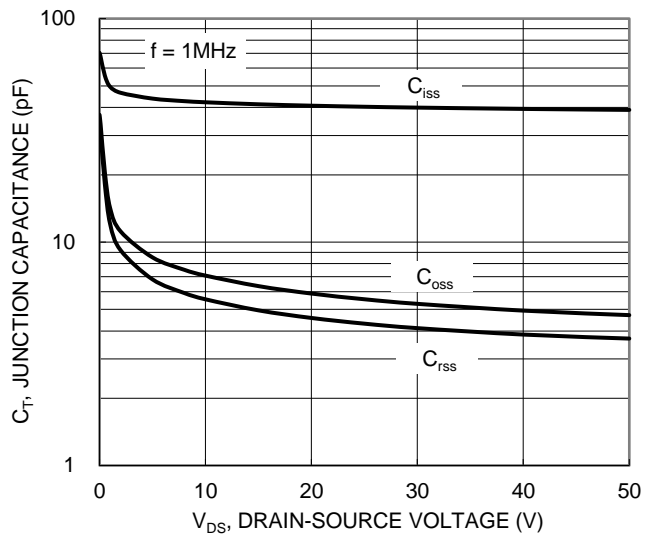


Figure 10. Typical Junction Capacitance

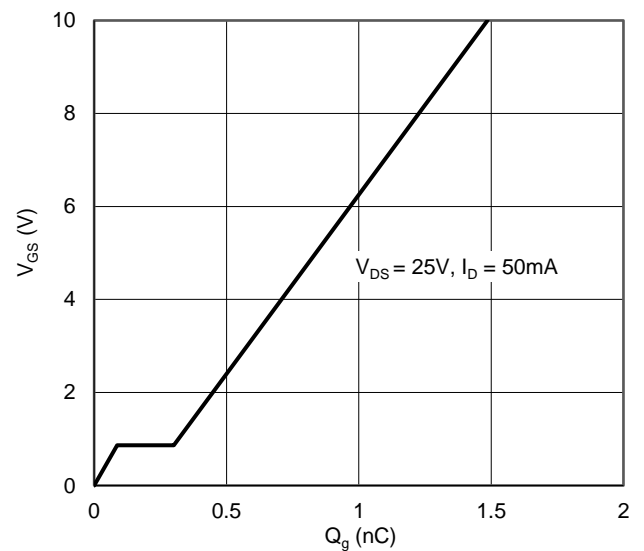


Figure 11. Gate Charge

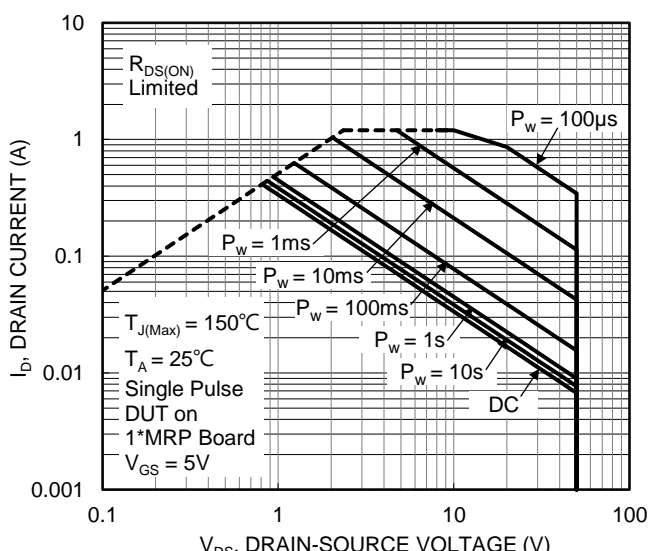


Figure 12. SOA, Safe Operation Area

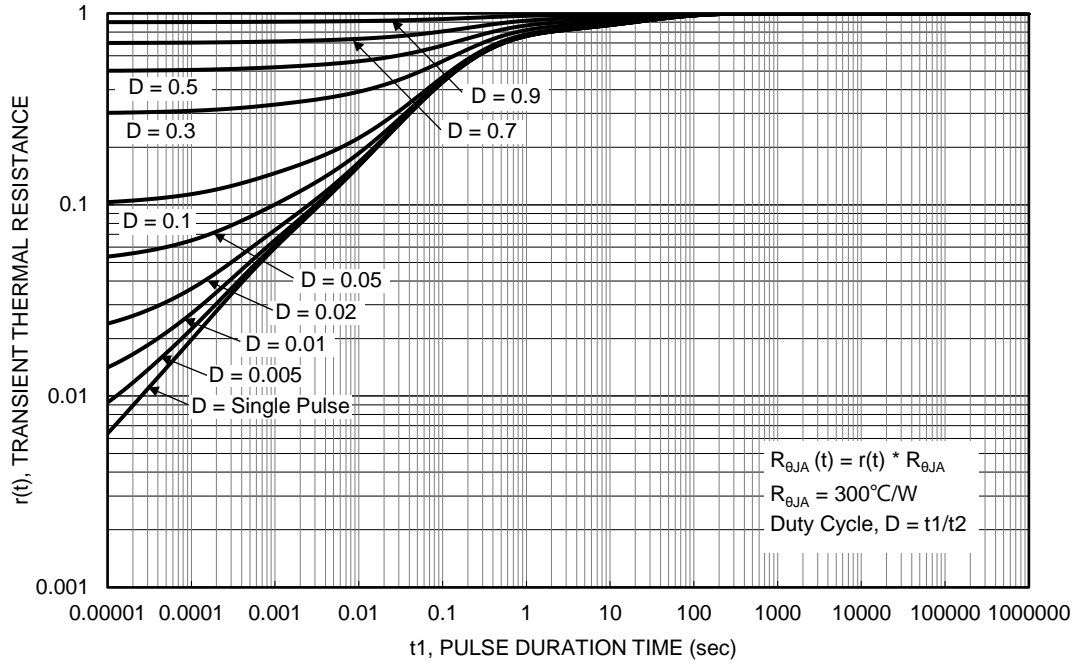
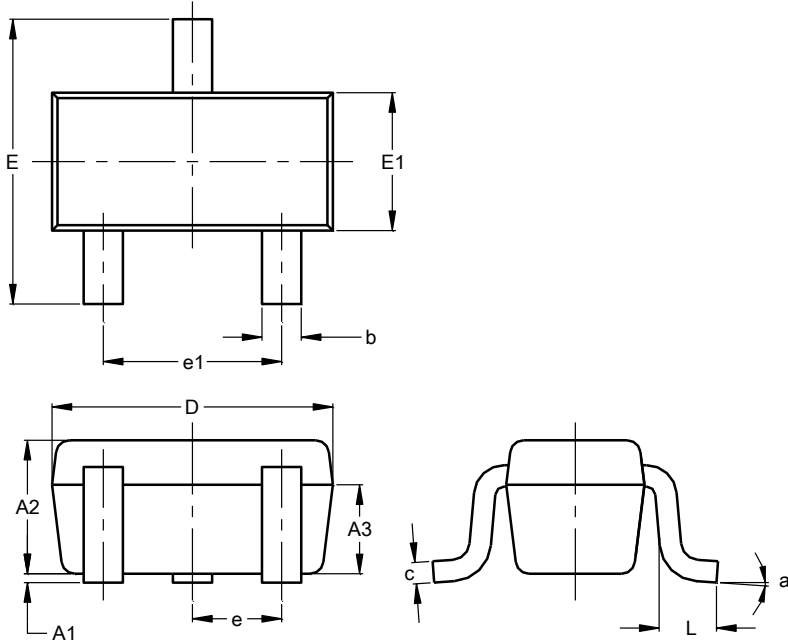


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**SOT523**

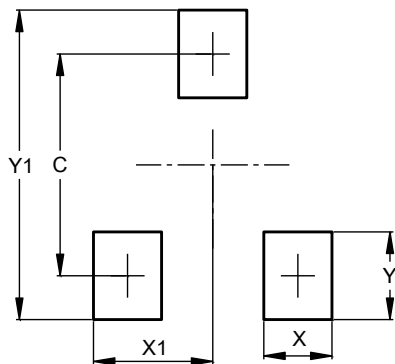


SOT523			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°
<b>All Dimensions in mm</b>			

**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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