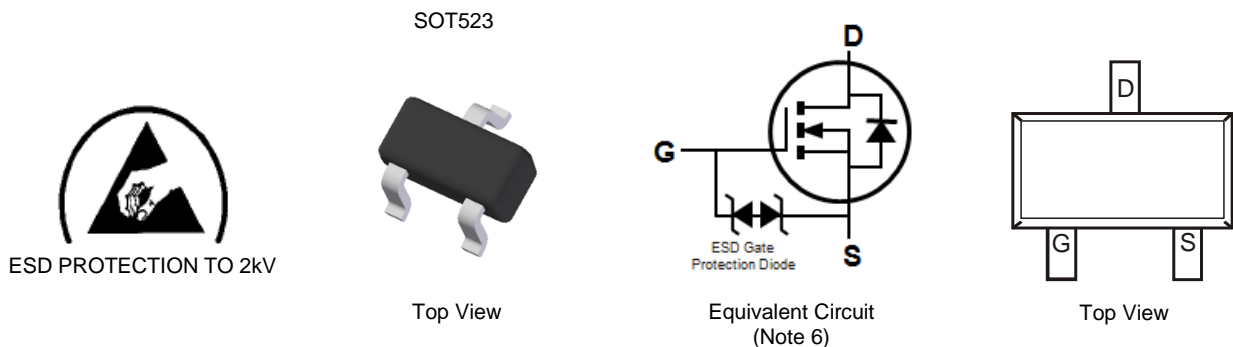


## Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected up to 2kV**
- **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**
- **PPAP Capable (Note 4)**

## 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  $\text{\textcircled{3}}$
- Terminal Connections: See Diagram
- Weight: 0.002 grams (Approximate)

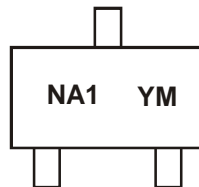


## Ordering Information (Note 5)

Part Number	Qualification	Case	Packaging
DMG1012T-7	Commercial	SOT523	3000/Tape & Reel
DMG1012T-13	Commercial	SOT523	10000/Tape & Reel
DMG1012TQ-7	Automotive	SOT523	3000/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. 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 <https://www.diodes.com/quality/>.
  5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.
  6. The ESD gate protection diode is only designed to protect against ESD events. No gate-source voltage greater than the maximum  $V_{GSS}$  rating (given on page 2) can be applied.

## Marking Information



NA1 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: F = 2018)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2009	...	2018	2019	2020	2021	2022	2023	2024	2025	2026
Code	W	...	F	G	H	I	J	K	L	M	N

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

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	20	V
Gate-Source Voltage			$V_{GSS}$	$\pm 6$	V
Continuous Drain Current (Note 7)	Steady State	$T_A = +25^\circ\text{C}$	$I_D$	0.63	A
		$T_A = +85^\circ\text{C}$		0.45	
Pulsed Drain Current			$I_{DM}$	3	A

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 7)	$P_D$	0.28	W
Thermal Resistance, Junction to Ambient (Note 7)	$R_{\theta JA}$	452	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	20	—	—	V	$V_{GS} = 0V, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	$I_{DSS}$	—	—	100	nA	$V_{DS} = 20V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 1.0$	$\mu\text{A}$	$V_{GS} = \pm 4.5V, V_{DS} = 0V$
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	0.5	—	1.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	0.3	0.4	$\Omega$	$V_{GS} = 4.5V, I_D = 600\text{mA}$
			0.4	0.5		$V_{GS} = 2.5V, I_D = 500\text{mA}$
			0.5	0.7		$V_{GS} = 1.8V, I_D = 350\text{mA}$
Forward Transfer Admittance	$ Y_{fs} $	—	1.4	—	S	$V_{DS} = 10V, I_D = 400\text{mA}$
Diode Forward Voltage	$V_{SD}$	—	0.7	1.2	V	$V_{GS} = 0V, I_S = 150\text{mA}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	—	60.67	—	pF	$V_{DS} = 16V, V_{GS} = 0V, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	9.68	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	5.37	—	pF	
Total Gate Charge	$Q_g$	—	736.6	—	pC	$V_{GS} = 4.5V, V_{DS} = 10V, I_D = 250\text{mA}$
Gate-Source Charge	$Q_{gs}$	—	93.6	—	pC	
Gate-Drain Charge	$Q_{gd}$	—	116.6	—	pC	
Turn-On Delay Time	$t_{D(ON)}$	—	5.1	—	ns	$V_{DD} = 10V, V_{GS} = 4.5V, R_L = 47\Omega, R_G = 10\Omega, I_D = 200\text{mA}$
Turn-On Rise Time	$t_R$	—	7.4	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	26.7	—	ns	
Turn-Off Fall Time	$t_F$	—	12.3	—	ns	

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

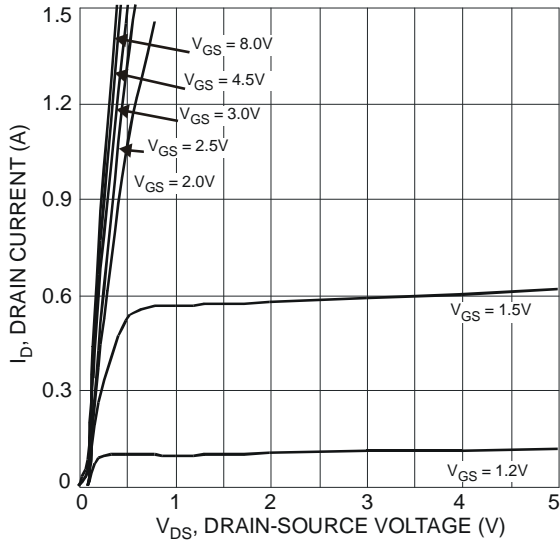


Fig. 1 Typical Output Characteristics

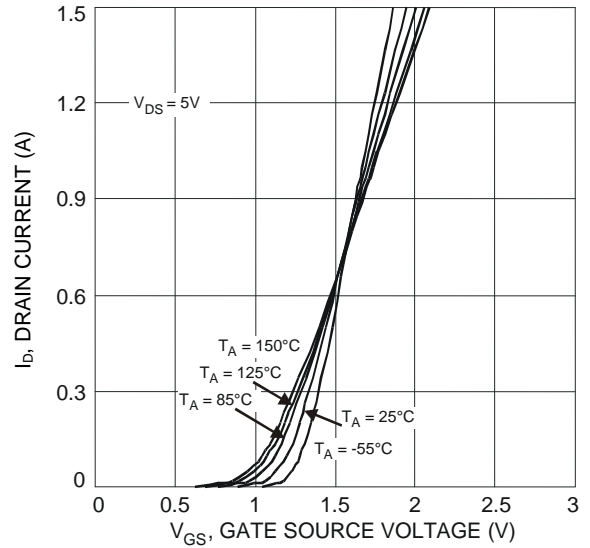


Fig. 2 Typical Transfer Characteristics

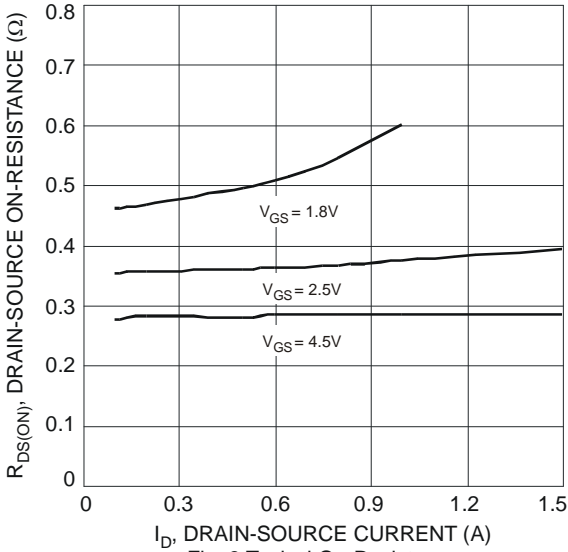


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

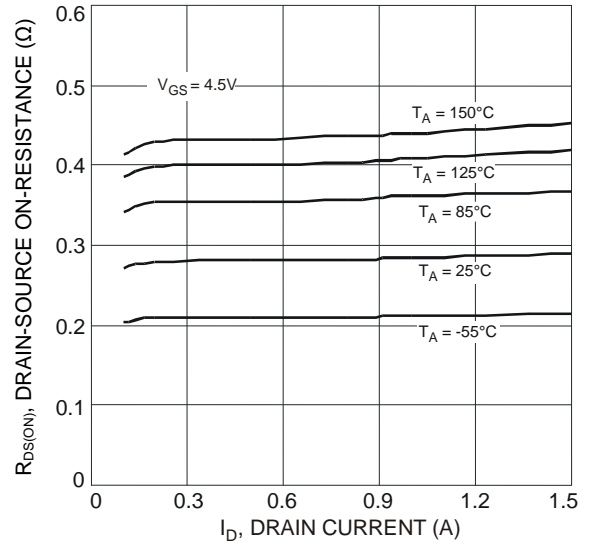


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

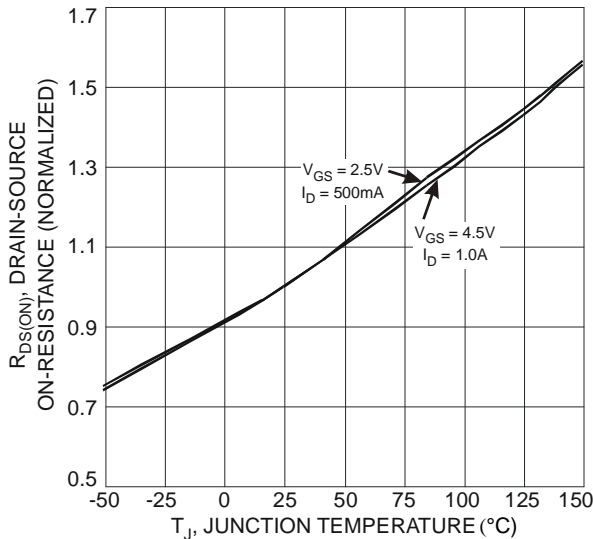


Fig. 5 On-Resistance Variation with Temperature

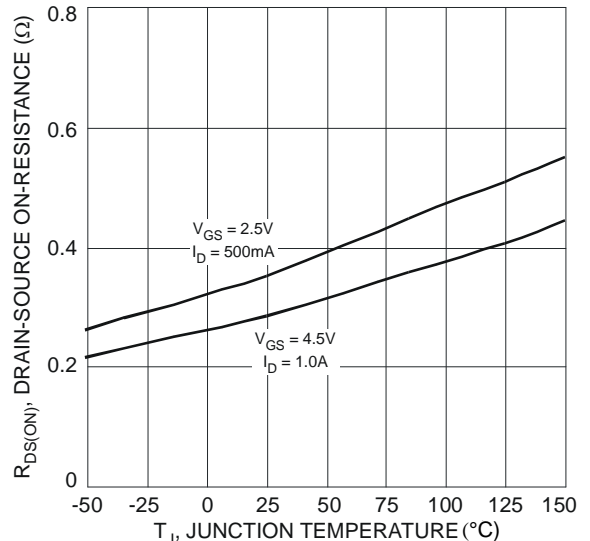


Fig. 6 On-Resistance Variation with Temperature

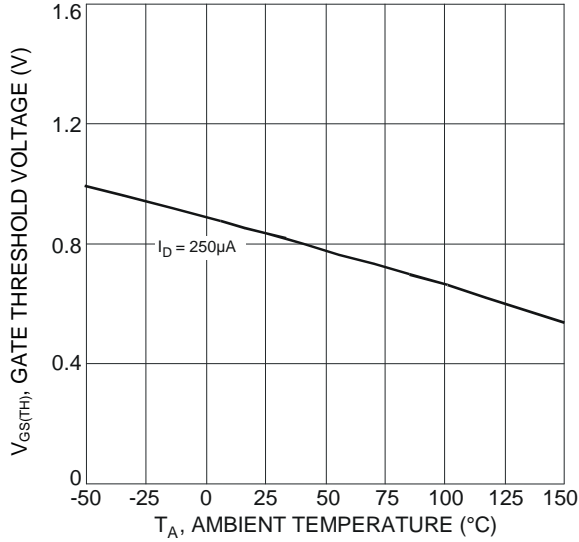


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

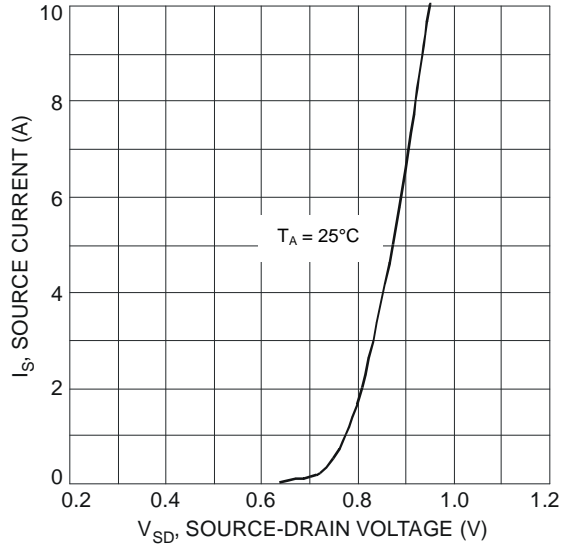


Fig. 8 Diode Forward Voltage vs. Current

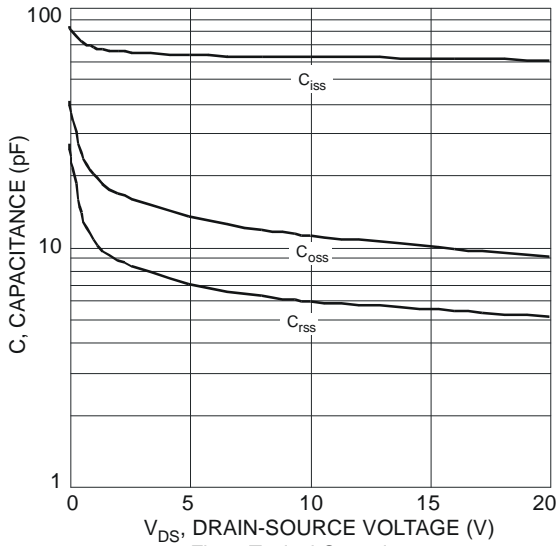


Fig. 9 Typical Capacitance

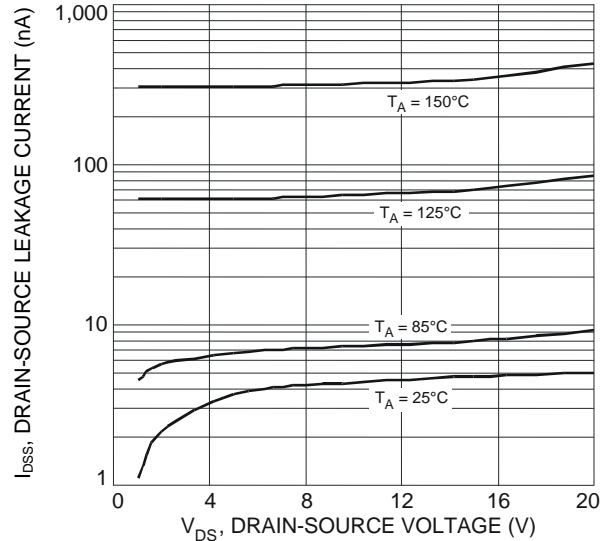


Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

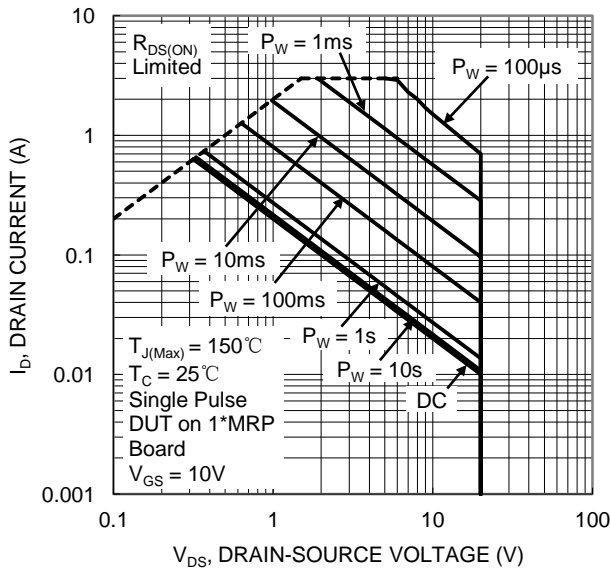


Fig. 11 SOA, Safe Operation Area

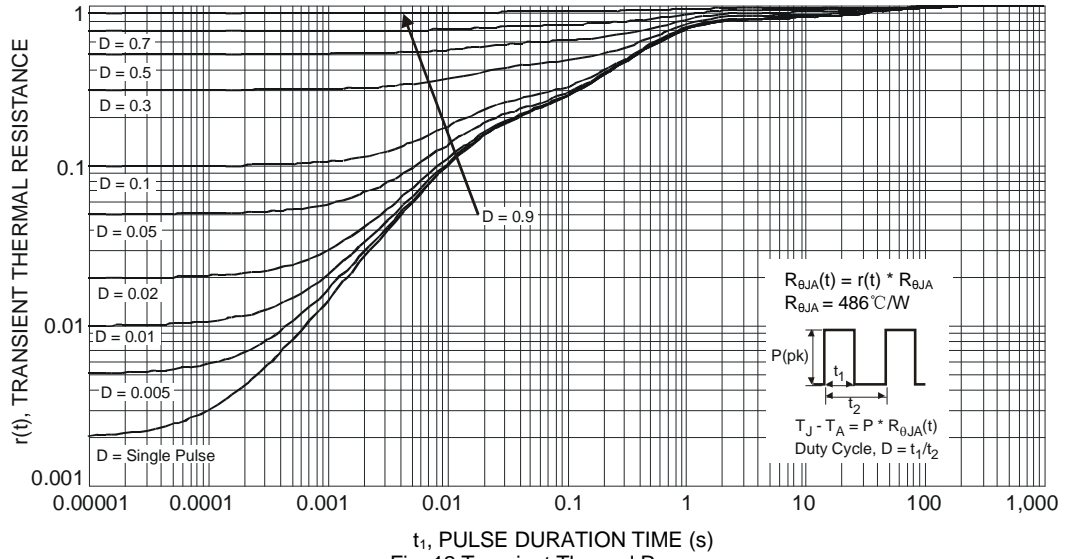
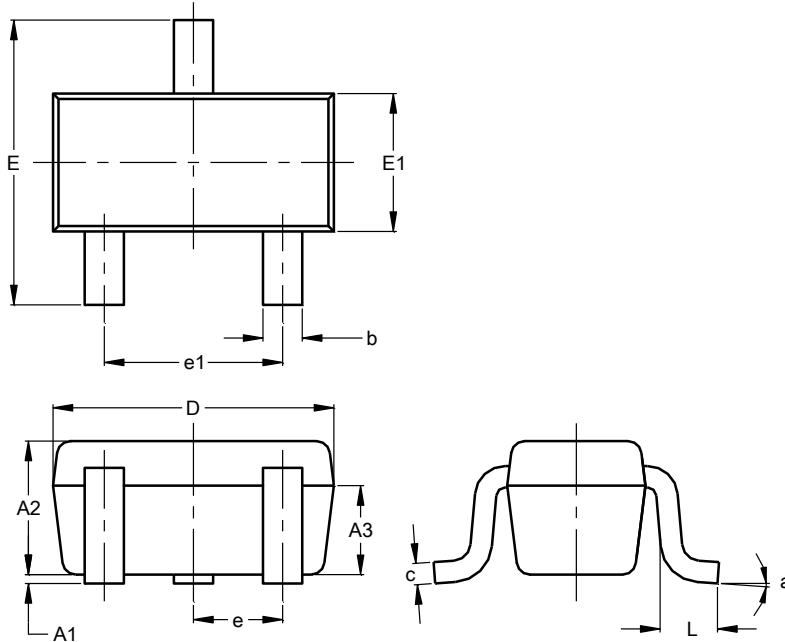


Fig. 12 Transient Thermal Response

## Package Outline Dimensions

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

### SOT523

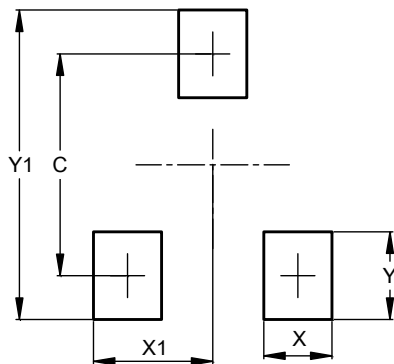


SOT523			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°
All Dimensions in mm			

## 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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