50V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
50V	2.0Ω @ V_{GS} = 5V	350mA
	2.5Ω @ V_{GS} = 2.5V	320mA
	4.0Ω @ V_{GS} = 1.8V	270mA

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 or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Description and Applications

This MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

- Motor driving
- Power management functions
- Load switching

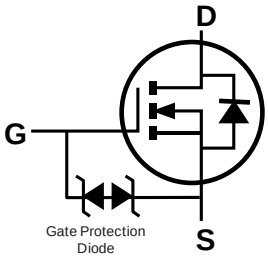
Mechanical Data

- 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)

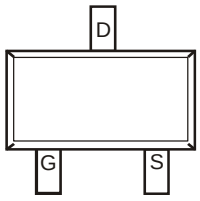




Top View



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/.

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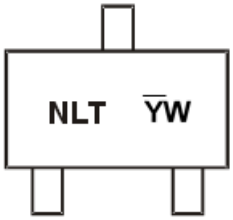
Marking Information



NLT = Product Type Marking Code
$\overline{Y}$W = Date Code Marking
$\overline{Y}$ = 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_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain Source Voltage			V_{DSS}	50	V
Gate-Source Voltage			V_{GSS}	±12	V
Continuous Drain Current (Note 5) V_{GS} = 5V	Steady State	T_A = +25°C T_A = +70°C	I_D	350 280	mA
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	350	mA
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	1.2	A
Pulsed Source Current (10µs Pulse, Duty Cycle = 1%)			I_{SM}	1.2	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)		P_D	0.4	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	300	°C/W
Total Power Dissipation (Note 5)		P_D	0.5	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	246	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-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.

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Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	50	—	—	V	V_{GS} = 0V, I_D = 10μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	V_{DS} = 50V, V_{GS} = 0V
Gate-Body Leakage	I_{GSS}	—	—	10	μA	V_{GS} = ±12V, V_{DS} = 0V
ON CHARACTERISTICS (Note7)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.49	—	1.2	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	— — —	0.97 1.2 1.6	2.0 2.5 4.0	Ω	V_{GS} = 5.0V, I_D = 50mA V_{GS} = 2.5V, I_D = 50mA V_{GS} = 1.8V , I_D = 50mA
Source-Drain Diode Forward Voltage	V_{SD}	—	0.6	1.4	V	V_{GS} = 0V, I_S = 50mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	40	—	pF	V_{DS} = 25V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	5.6	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	4.3	—	pF	
Gate Resistance	R_g	—	52	—	Ω	V_{DS} = 0V, V_{GS} = 0V f = 1.0MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	0.8	—	nC	V_{DS} = 25V, I_D = 50mA
Total Gate Charge (V_{GS} = 10V)	Q_g	—	1.5	—	nC	
Gate-Source Charge	Q_{gs}	—	0.1	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.2	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	1.3	—	ns	V_{DS} = 25V, V_{GS} = 10V R_g = 50Ω, I_D = 50mA
Turn-On Rise Time	t_R	—	9.6	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	32	—	ns	
Turn-Off Fall Time	t_F	—	41	—	ns	

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

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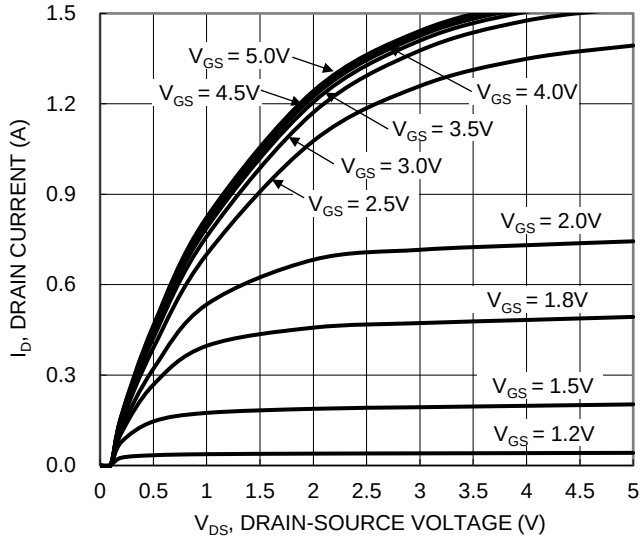

Figure 1. Typical Output Characteristic

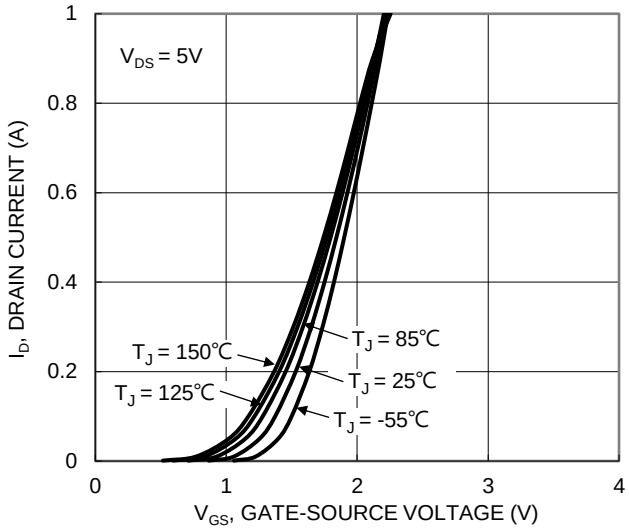

Figure 2. Typical Transfer Characteristic

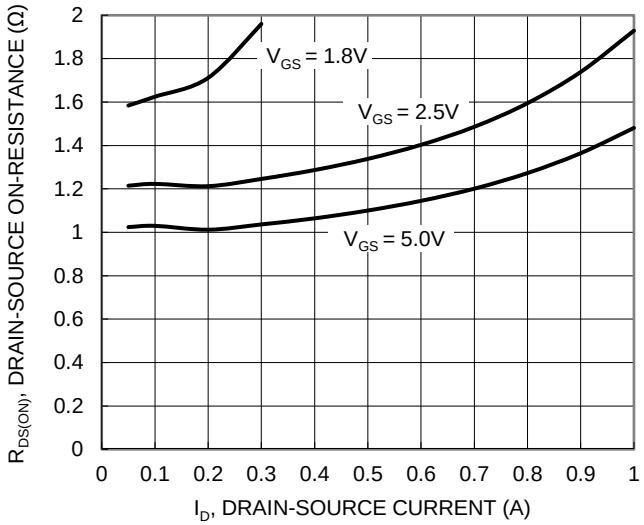

Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

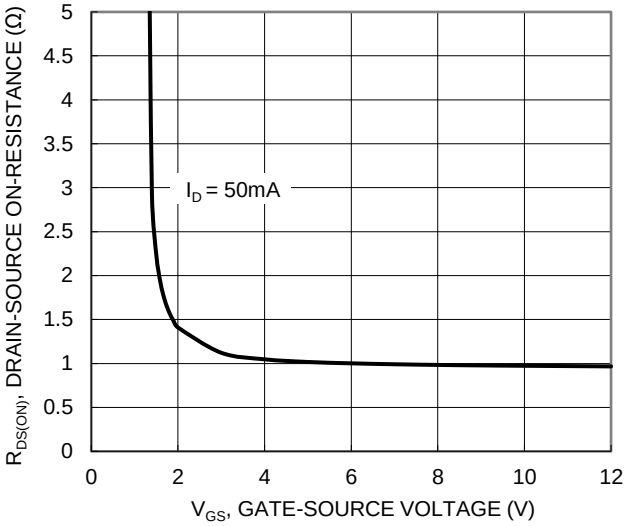

Figure 4. Typical Transfer Characteristic

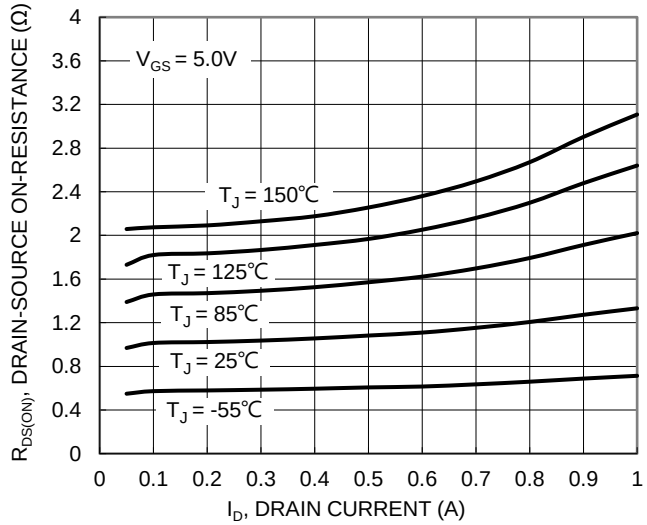

Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

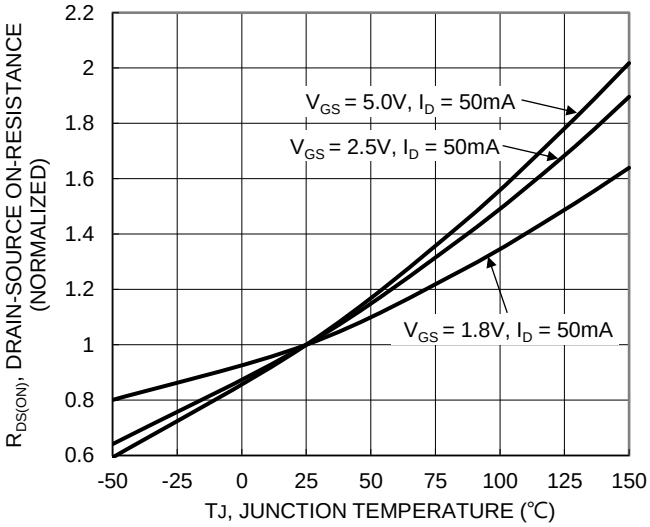

Figure 6. On-Resistance Variation with Junction Temperature

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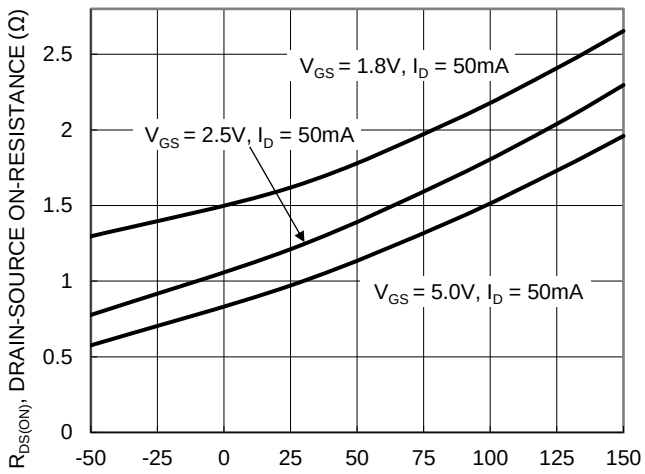

Figure 7. On-Resistance Variation with Junction Temperature

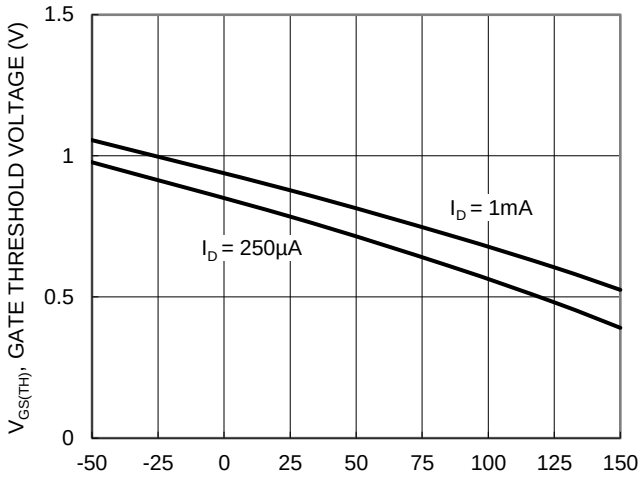

Figure 8. Gate Threshold Variation vs Junction Temperature

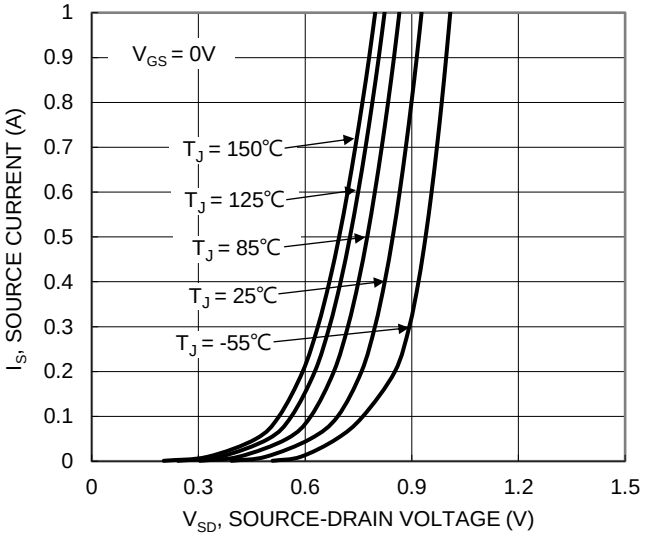

Figure 9. Diode Forward Voltage vs. Current

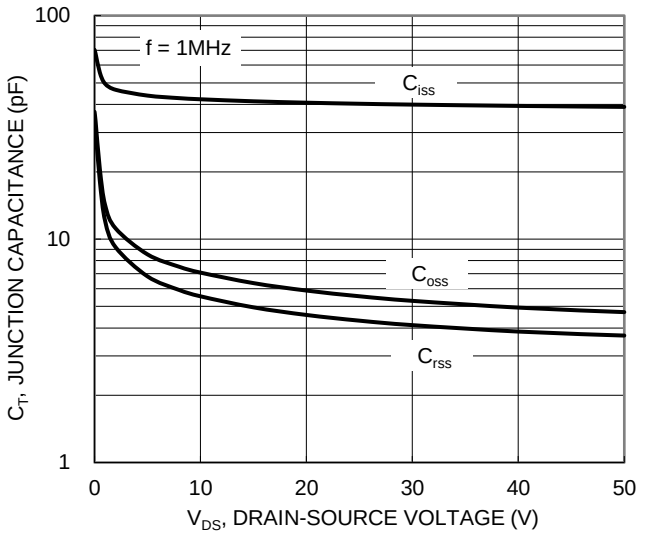

Figure 10. Typical Junction Capacitance

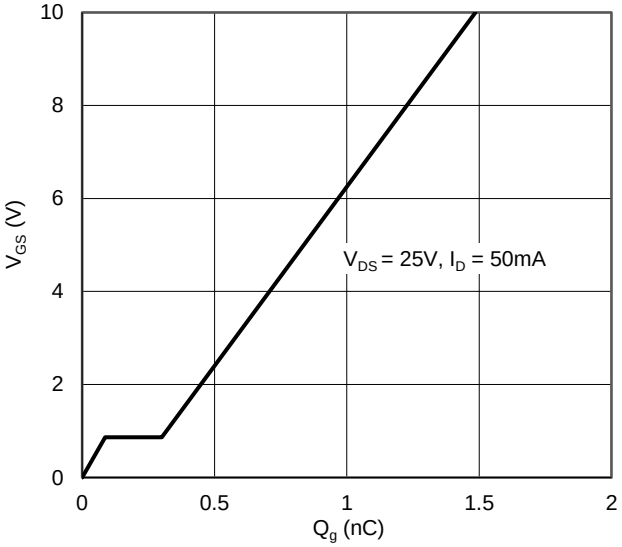

Figure 11. Gate Charge

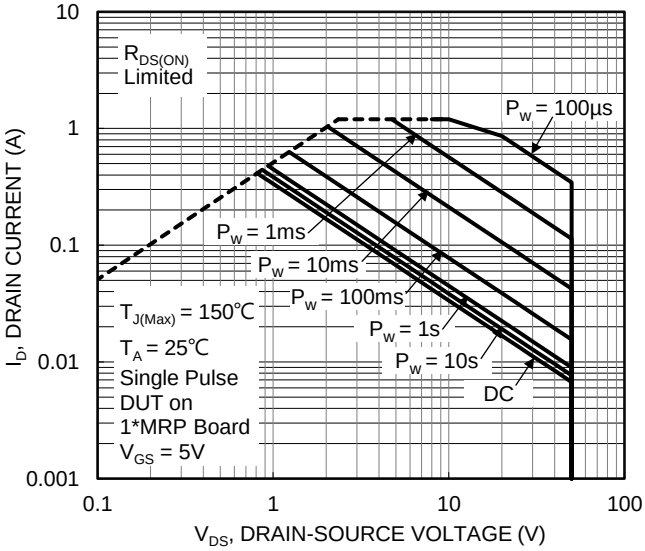

Figure 12. SOA, Safe Operation Area

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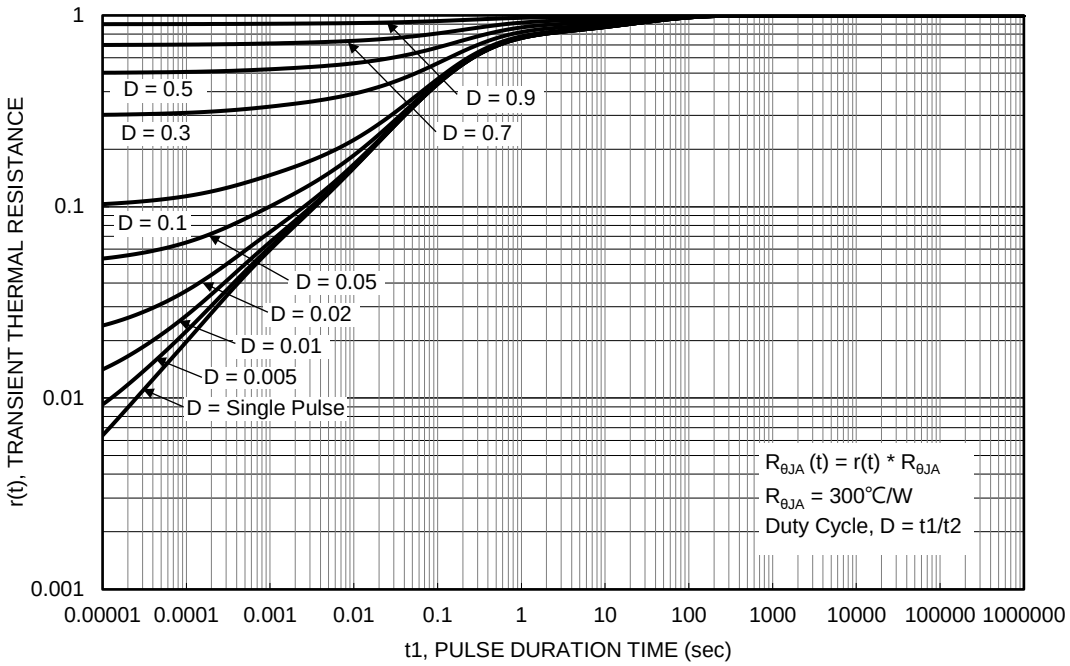

Figure 13. Transient Thermal Resistance

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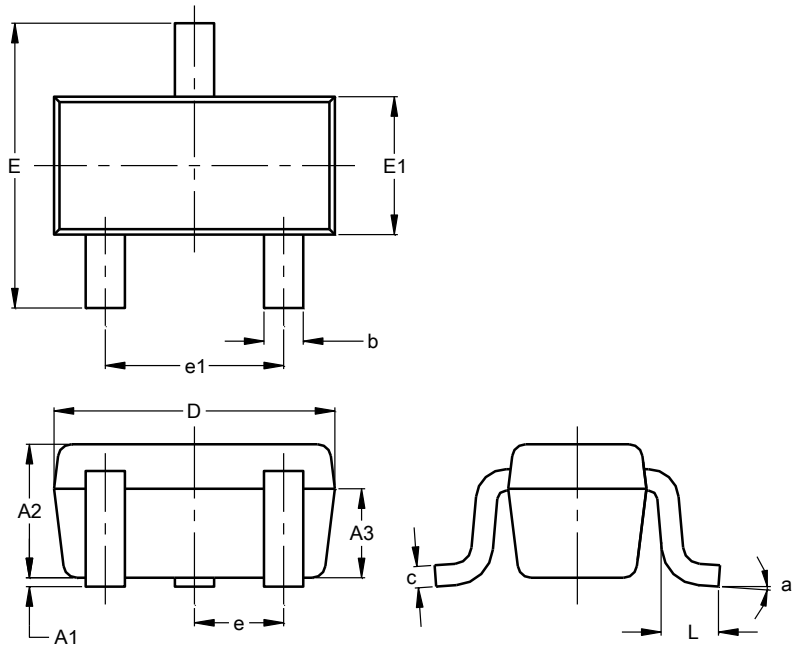
Package Outline Dimensions

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

SOT523

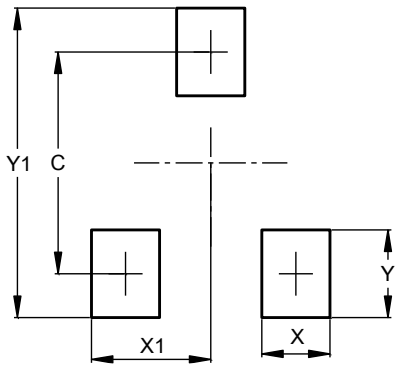


SOT523			
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°
All Dimensions in mm			

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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