

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>A</sub> = +25°C
20V	42mΩ @ V <sub>GS</sub> = 10V	3.5A
	45mΩ @ V <sub>GS</sub> = 4.5V	3.3A

## Description

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

## 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)**

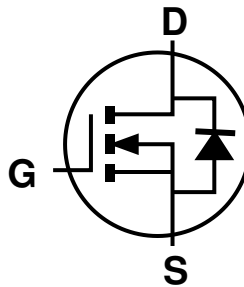
## Mechanical Data

- 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 <sup>(e3)</sup>
- Weight: 0.006 grams (Approximate)

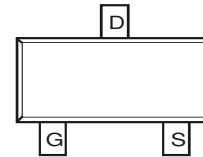
SOT323



Top View



Equivalent Circuit



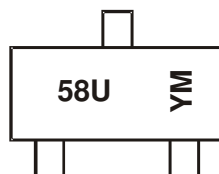
Top View

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2058UW-7	SOT323	3000/Tape & Reel
DMN2058UW-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



58U = Product Type Marking Code  
 YM or YM = Date Code Marking for SAT  
 Y or Y = Year (ex: F = 2018)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2017	2018	2019	2020	2021	2022	2023	2024	2025
Code	E	F	G	H	I	J	K	L	M

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<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>	±12	V	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C	3.5	A
		T <sub>A</sub> = +70°C	3.0	A
Maximum Continuous Body Diode Forward Current (Note 6)	I <sub>S</sub>	1.0	A	
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%) (Note 6)	I <sub>DM</sub>	20	A	

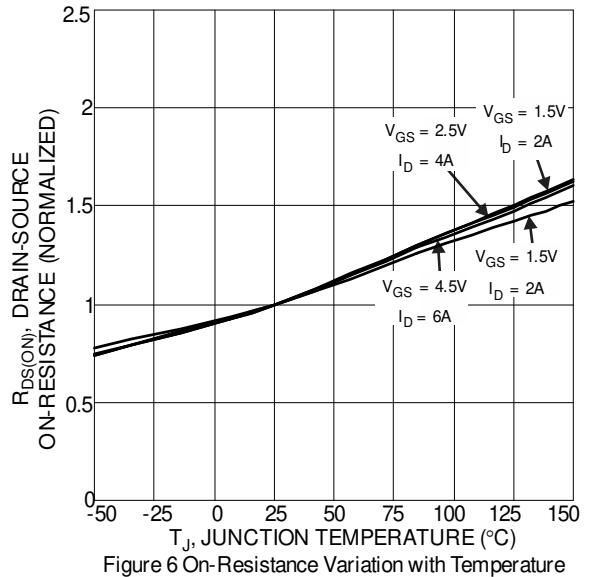
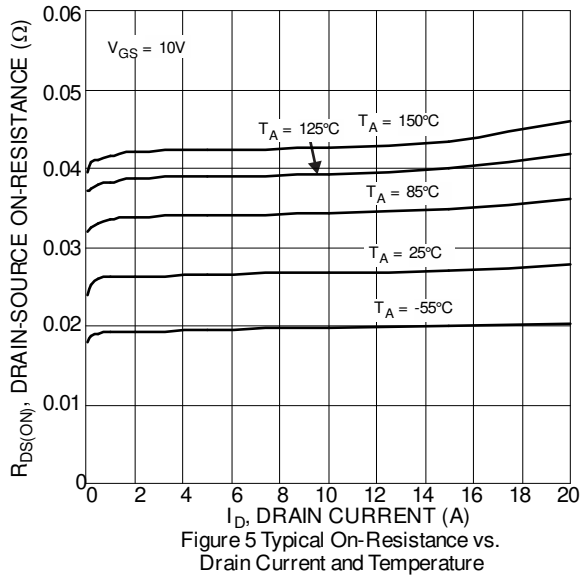
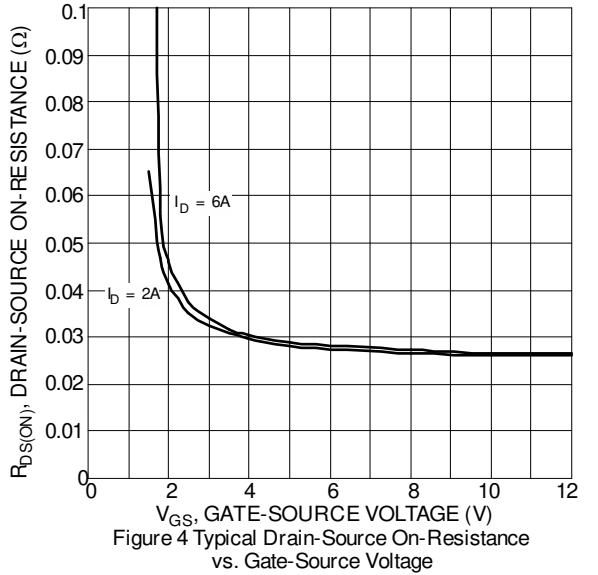
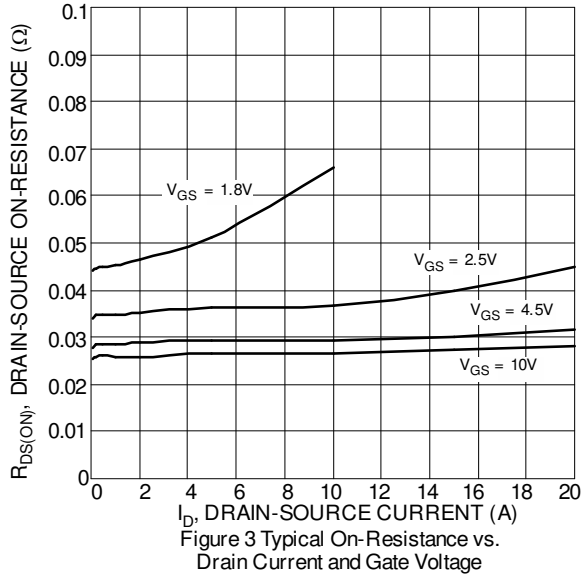
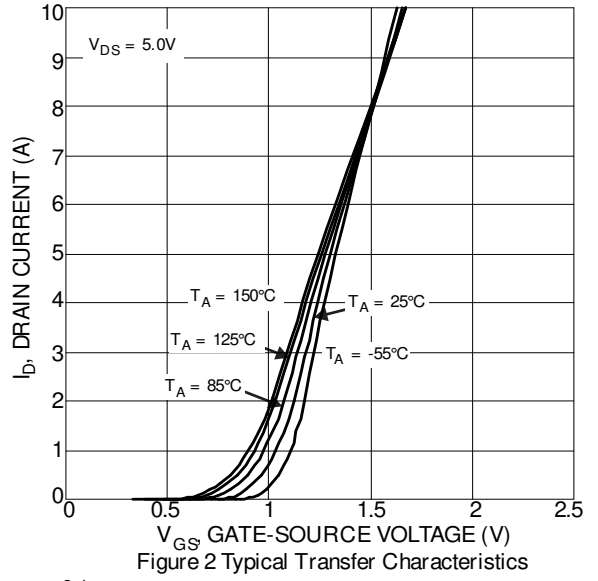
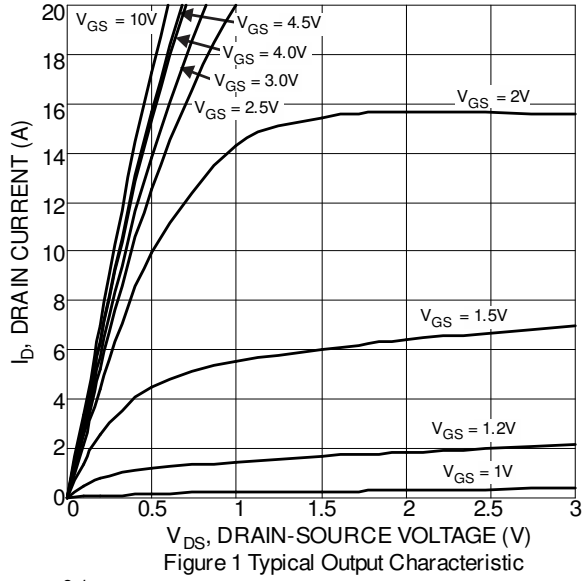
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P <sub>D</sub>	0.5	mW
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	259	°C/W
Total Power Dissipation (Note 6)	P <sub>D</sub>	0.7	mW
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	175	°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	μA	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.4	—	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>	—	31.5	42	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 3A
			32	45		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 2A
			40.5	60		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 2A
			48	91		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 1A
Diode Forward Voltage	V <sub>SD</sub>	—	0.78	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>ISS</sub>	—	281	—	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>OSS</sub>	—	50	—	pF	
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	39	—	pF	
Gate Resistance	R <sub>g</sub>	—	3.1	—	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>	—	3.6	—	nC	V <sub>DS</sub> = 10V, I <sub>D</sub> = 6.0A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	7.7	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	0.5	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	0.9	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	2.0	—	ns	V <sub>GS</sub> = 4.5V, V <sub>DD</sub> = 10V, R <sub>g</sub> = 6Ω, I <sub>D</sub> = 6.0A
Turn-On Rise Time	t <sub>r</sub>	—	4.9	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	9.9	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	3.3	—	ns	
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	5.4	—	ns	
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	0.7	—	nC	I <sub>F</sub> = 6.0A, 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.



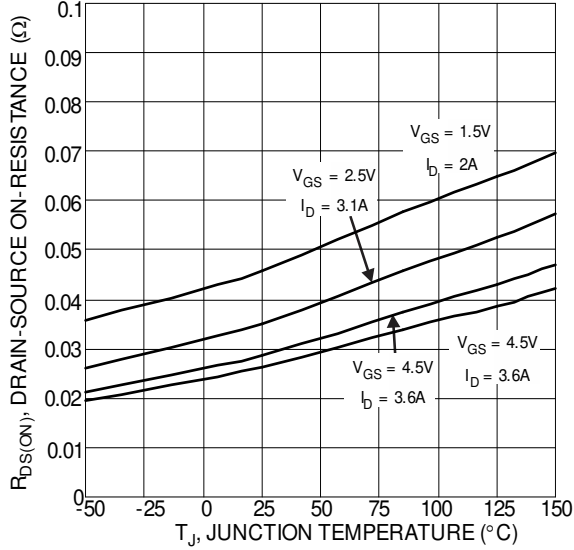


Figure 7 On-Resistance Variation with Temperature

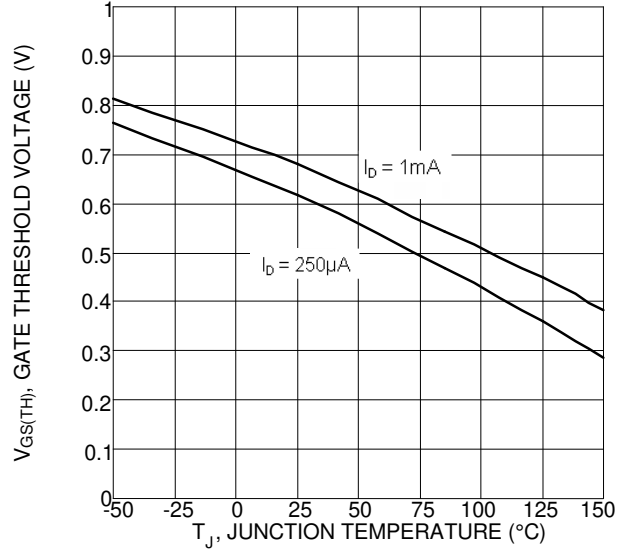


Figure 8 Gate Threshold Variation vs. Junction Temperature

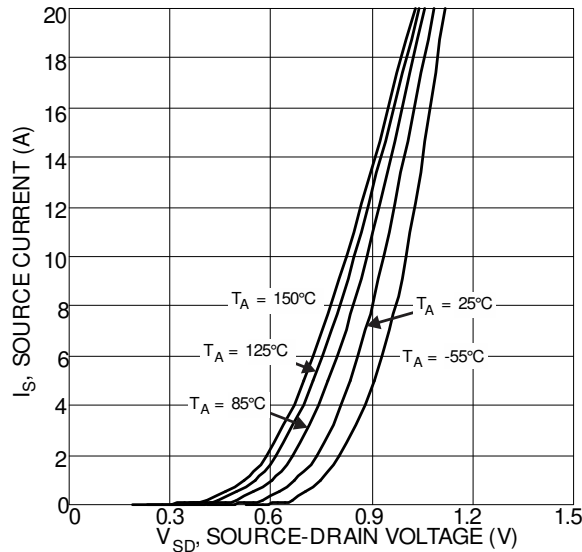


Figure 9 Diode Forward Voltage vs. Current

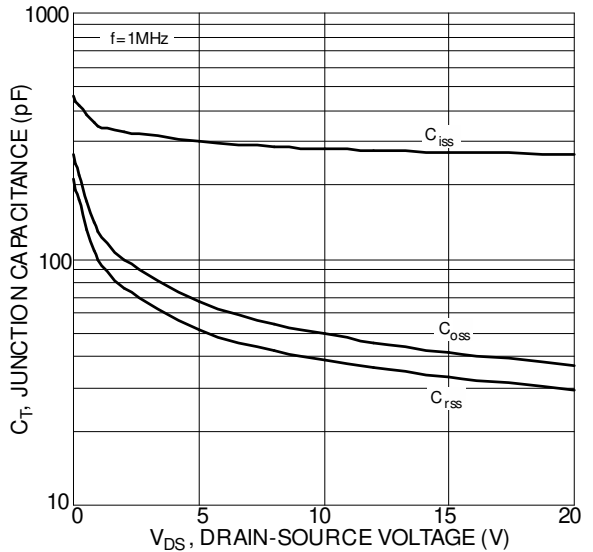


Figure 10 Typical Junction Capacitance

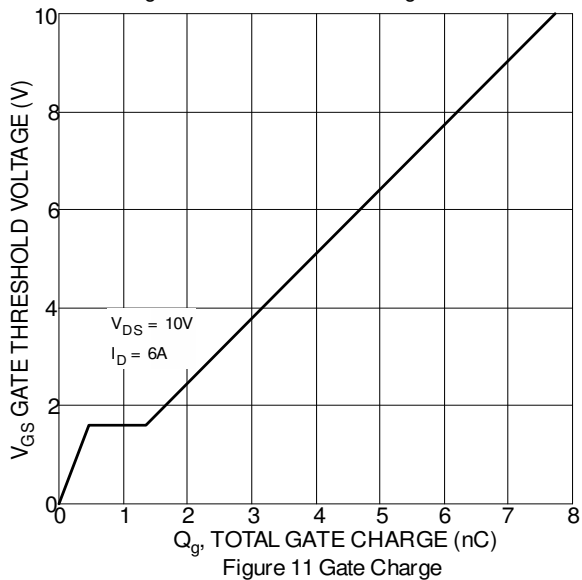


Figure 11 Gate Charge

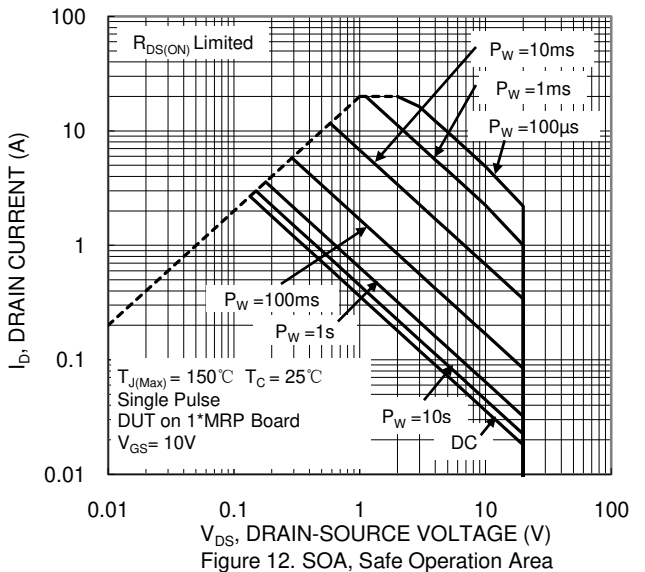


Figure 12. SOA, Safe Operation Area

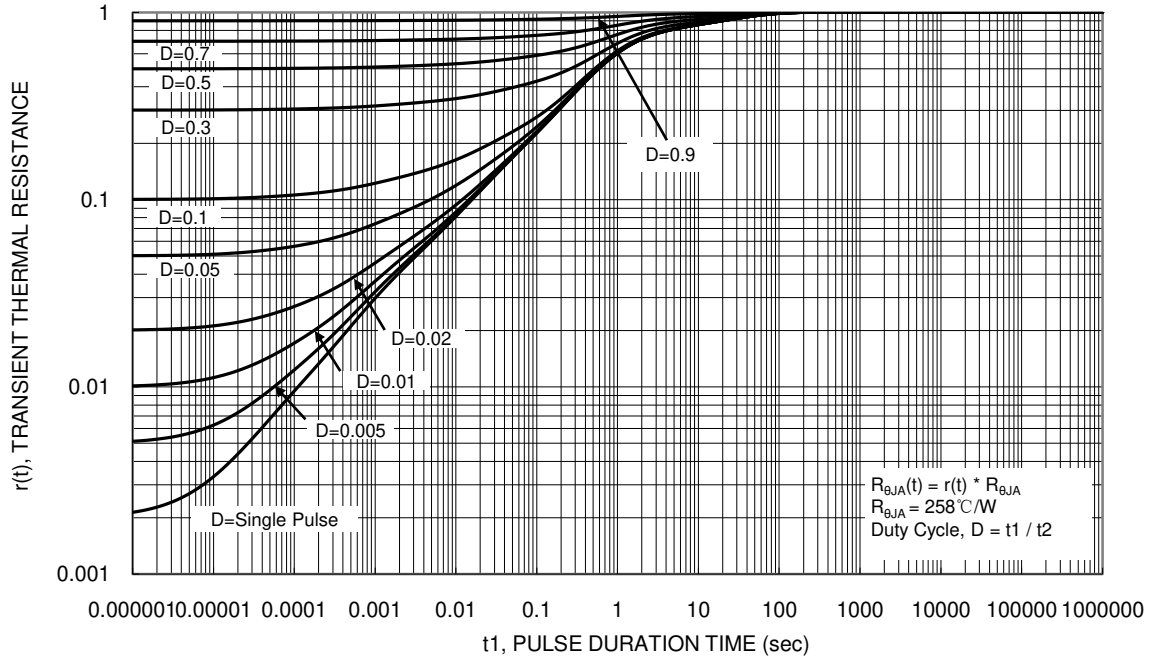
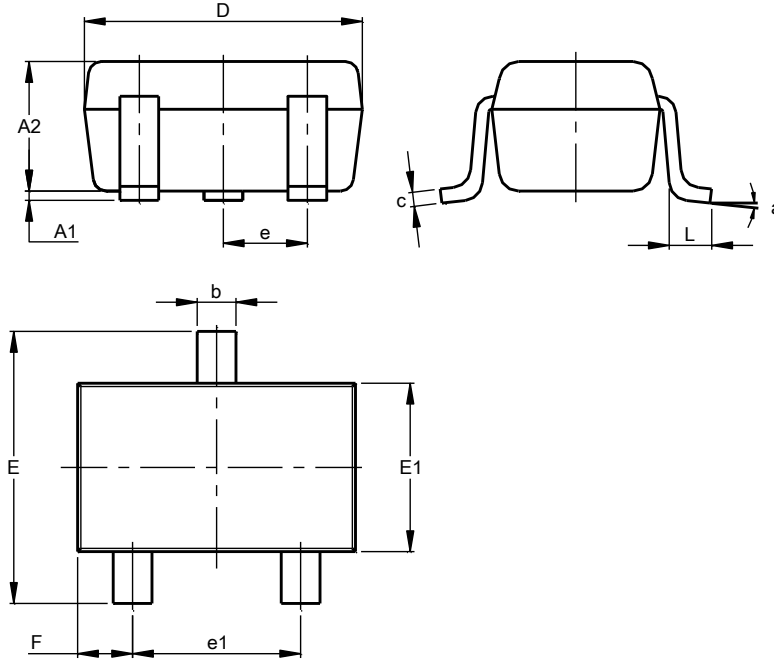


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**SOT323**

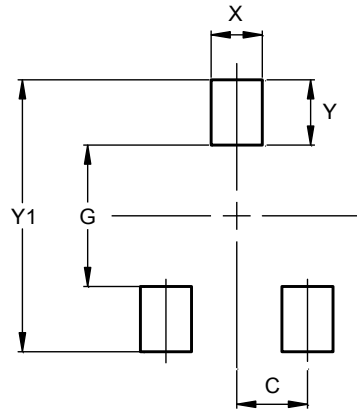


SOT323			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.25	0.40	0.30
c	0.10	0.18	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
e1	1.20	1.40	1.30
F	0.375	0.475	0.425
L	0.25	0.40	0.30
a	0°	8°	--
<b>All Dimensions in mm</b>			

**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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