

## Features

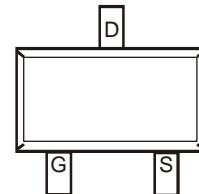
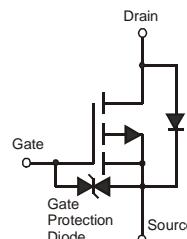
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Mechanical Data

- Case: SOT323
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Alloy 42 Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.006 grams (Approximate)



Top View



Top View

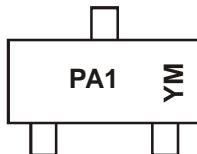
## Ordering Information (Note 5)

Part Number	Case	Packaging
DMG1013UWQ-7	SOT323	3000 / Tape & Reel
DMG1013UWQ-13	SOT323	10000 / Tape & Reel

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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. Refer to [http://www.diodes.com/product\\_compliance\\_definitions.html](http://www.diodes.com/product_compliance_definitions.html).
5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



PA1 = Product Type Marking Code

YM = Date Code Marking

Y = Year (ex: D = 2016)

M = Month (ex: 9 = September)

### Date Code Key

Year	2008	...	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Code	V	...	C	D	E	F	G	H	I	J	K	L
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 6)	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +85^\circ\text{C}$	$I_D$	-0.82 -0.54	A
Pulsed Drain Current (Note 7)			$I_{DM}$	-3	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	$P_D$	0.31	W
Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 6)	$R_{\theta JA}$	398	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

Notes: 6. Device mounted on FR-4 PCB, with minimum recommended pad layout.  
7. Repetitive rating, pulse width limited by junction temperature.

**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	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	$I_{DSS}$	-	-	-100	nA	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	-	-	$\pm 2.0$	$\mu\text{A}$	$V_{GS} = \pm 4.5\text{V}, V_{DS} = 0\text{V}$
<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	$R_{DS(ON)}$	-	0.5 0.7 1.0	0.75 1.05 1.5	$\Omega$	$V_{GS} = -4.5\text{V}, I_D = -430\text{mA}$ $V_{GS} = -2.5\text{V}, I_D = -300\text{mA}$ $V_{GS} = -1.8\text{V}, I_D = -150\text{mA}$
Forward Transfer Admittance	$ Y_{fs} $	-	0.9	-	S	$V_{DS} = -10\text{V}, I_D = -250\text{mA}$
Diode Forward Voltage	$V_{SD}$		-0.8	-1.2	V	$V_{GS} = 0\text{V}, I_S = -150\text{mA}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	-	59.76	-	pF	$V_{DS} = -16\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	-	12.07	-	pF	
Reverse Transfer Capacitance	$C_{rss}$	-	6.36	-	pF	
Total Gate Charge	$Q_g$	-	622.4	-	pC	$V_{GS} = -4.5\text{V}, V_{DS} = -10\text{V}, I_D = -250\text{mA}$
Gate-Source Charge	$Q_{gs}$	-	100.3	-	pC	
Gate-Drain Charge	$Q_{gd}$	-	132.2	-	pC	
Turn-On Delay Time	$t_{D(ON)}$	-	5.1	-	ns	$V_{DD} = -10\text{V}, V_{GS} = -4.5\text{V}, R_L = 47\Omega, R_G = 10\Omega, I_D = -200\text{mA}$
Turn-On Rise Time	$t_R$	-	8.1	-	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	-	28.4	-	ns	
Turn-Off Fall Time	$t_F$	-	20.7	-	ns	

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

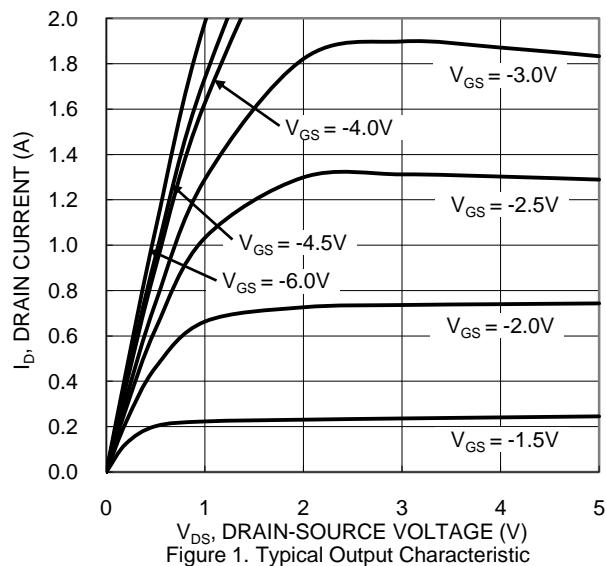


Figure 1. Typical Output Characteristic

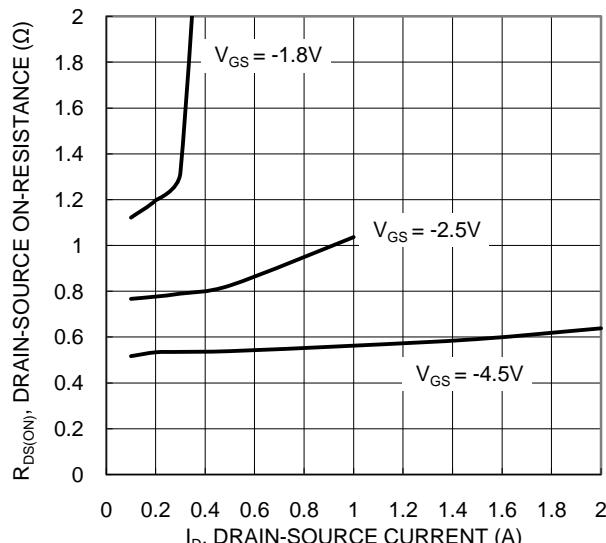


Figure 3. Typical On-Resistance vs Drain Current and Gate Voltage

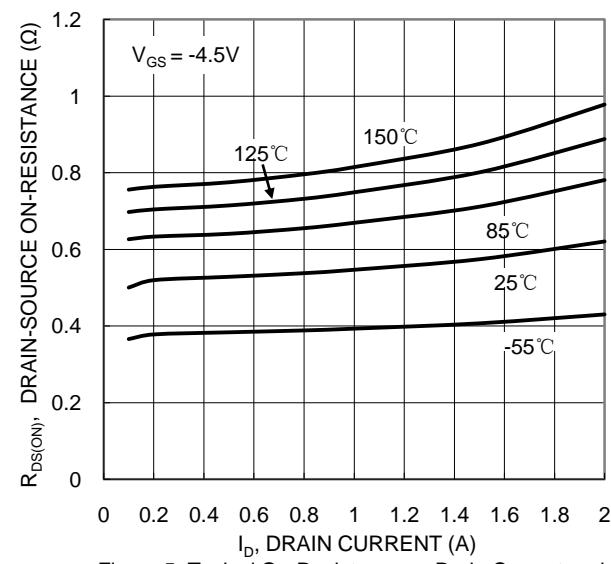


Figure 5. Typical On-Resistance vs Drain Current and Junction Temperature

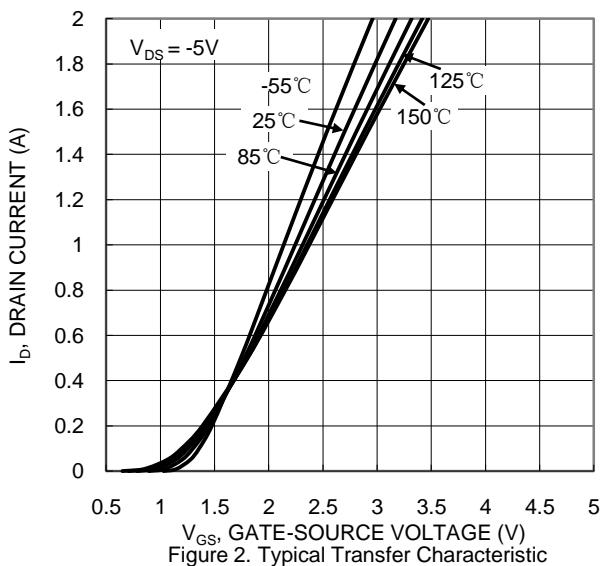


Figure 2. Typical Transfer Characteristic

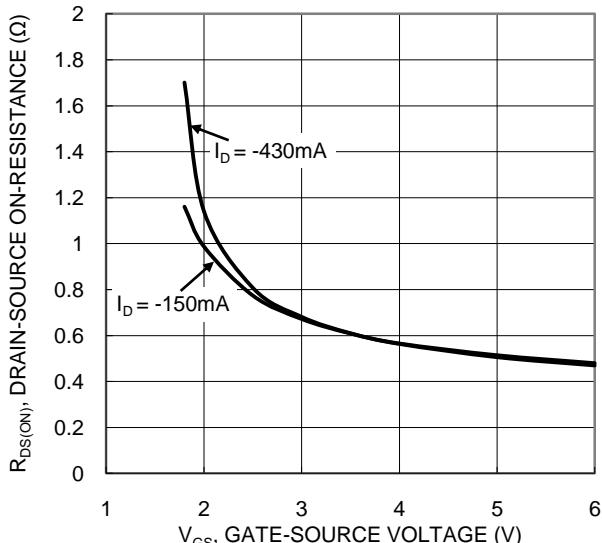


Figure 4. Typical Transfer Characteristic

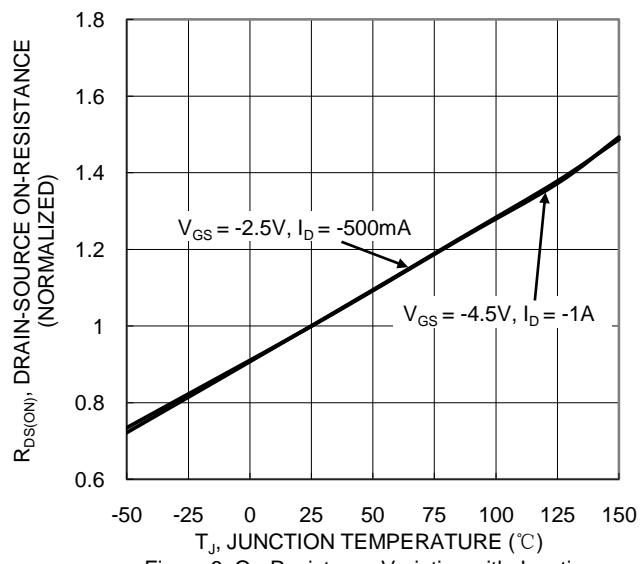


Figure 6. On-Resistance Variation with Junction Temperature

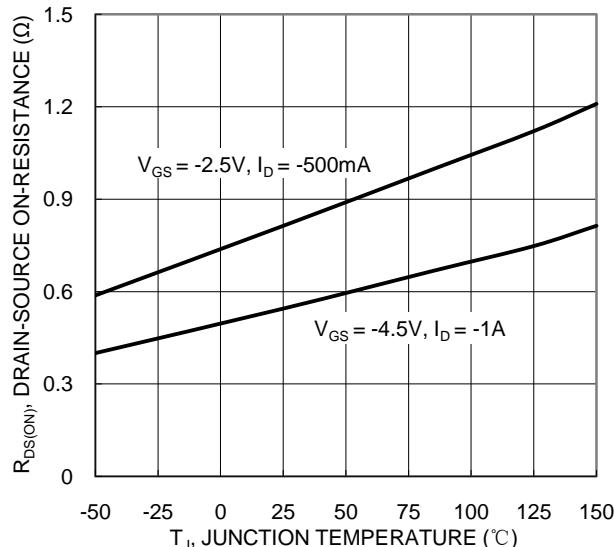


Figure 7. On-Resistance Variation with Junction Temperature

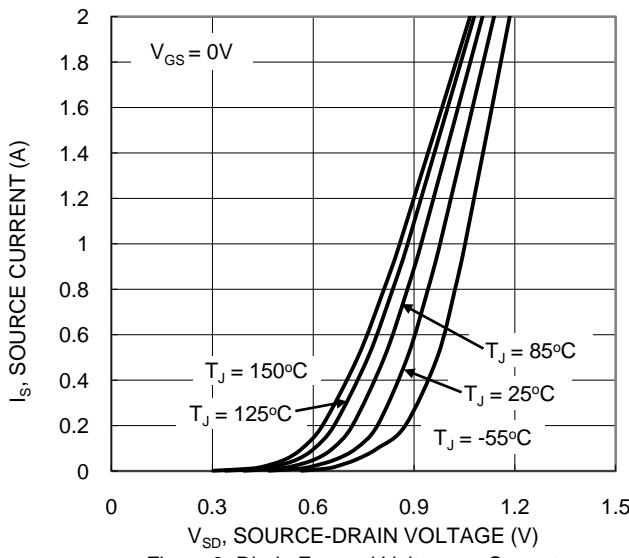


Figure 9. Diode Forward Voltage vs Current

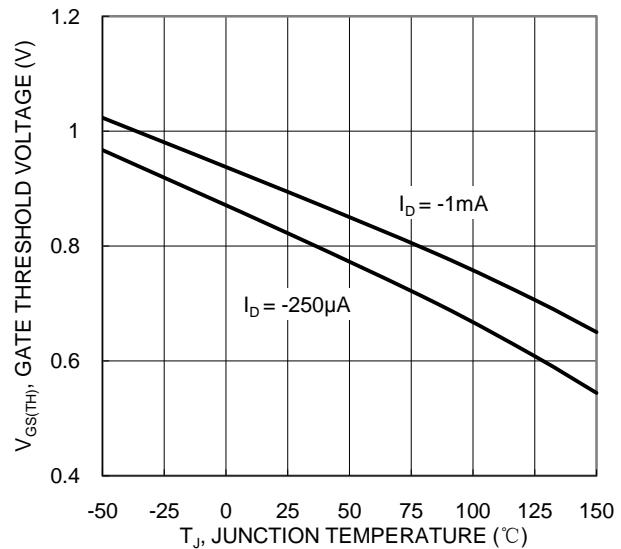


Figure 8. Gate Threshold Variation vs Junction Temperature

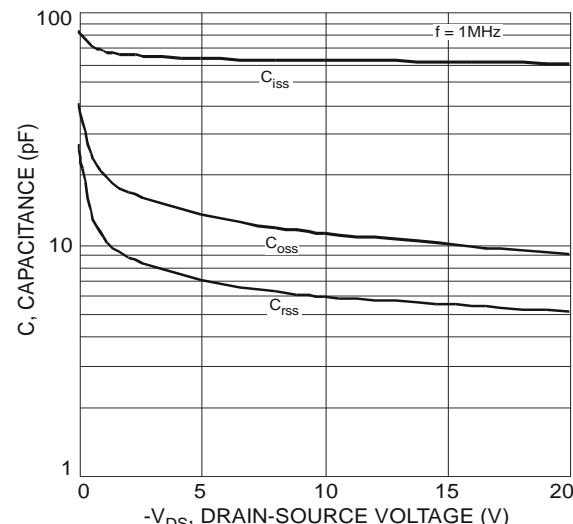


Figure 10. Typical Total Capacitance

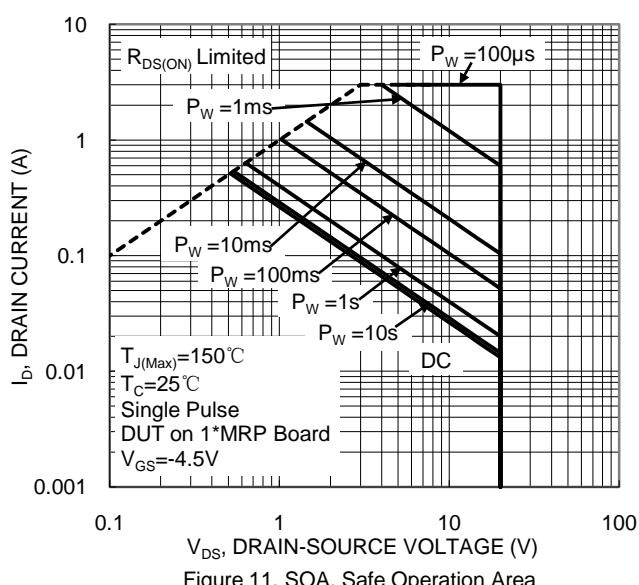


Figure 11. SOA, Safe Operation Area

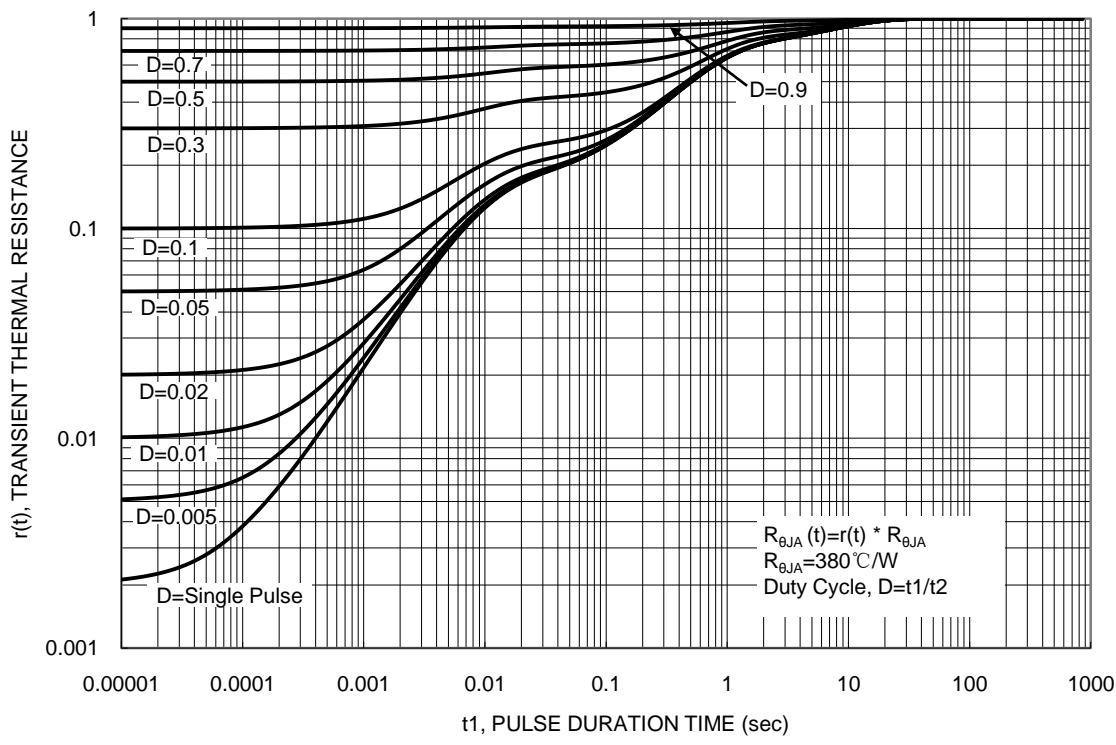
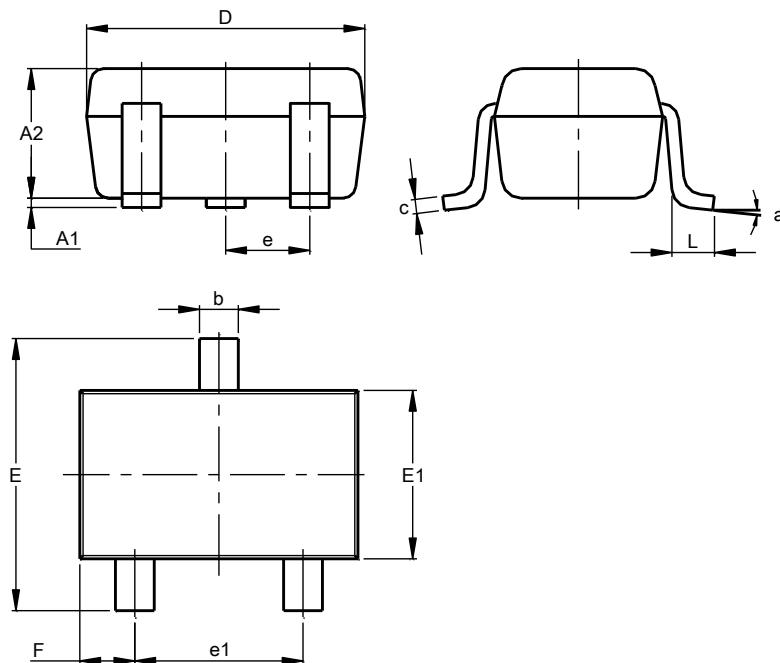


Figure 12. Transient Thermal Resistance

## Package Outline Dimensions

Please see AP02001 at [http://www.diodes.com/\\_files/datasheets/ap02001.pdf](http://www.diodes.com/_files/datasheets/ap02001.pdf) for the latest version.

SOT323

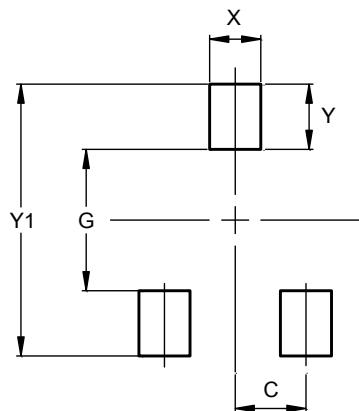


SOT323			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.25	0.40	0.30
c	0.10	0.18	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
e1	1.20	1.40	1.30
F	0.375	0.475	0.425
L	0.25	0.40	0.30
a	8°		
All Dimensions in mm			

## Suggested Pad Layout

Please see AP02001 at [http://www.diodes.com/\\_files/datasheets/ap02001.pdf](http://www.diodes.com/_files/datasheets/ap02001.pdf) 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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