

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max $T_A = +25^\circ\text{C}$
-60V	28m Ω @ $V_{GS} = -10\text{V}$	-7A
	35m Ω @ $V_{GS} = -4.5\text{V}$	-6.2A

Description and Applications

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

- Backlighting
- Power Management Functions
- DC-DC Converters

Features and Benefits

- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive
- Low Input Capacitance
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

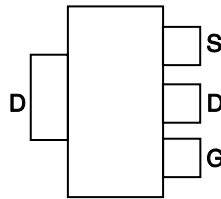
Mechanical Data

- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.112 grams (Approximate)

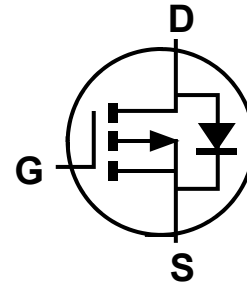
SOT223



Top View



Pin Out - Top View



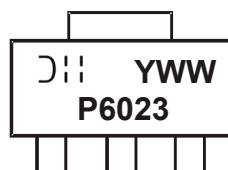
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Compliance	Case	Packaging
DMP6023LE-13	Standard	SOT223	2,500/Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 2. See 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



D = Manufacturer's Marking
 P6023 = Marking Code
 YWW = Date Code Marking
 Y or Y = Year (ex: 4 = 2014)
 WW = Week (01 - 53)

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

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V_{DSS}	-60	V
Gate-Source Voltage	V_{GSS}	± 20	V
Continuous Drain Current (Note 5) $V_{GS} = -10\text{V}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	-7 -5.6	A
	$T_C = +25^\circ\text{C}$ $T_C = +70^\circ\text{C}$	-18.2 -14.5	A
Pulsed Drain Current (10 μs pulse, duty cycle = 1%)	I_{DM}	-50	A
Maximum Continuous Body Diode Forward Current (Note 5)	I_S	-2	A
Avalanche Current, L = 0.1mH	I_{AS}	-35.5	A
Avalanche Energy, L = 0.1mH	E_{AS}	62.9	mJ

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P_D	$T_A = +25^\circ\text{C}$	2
		$T_A = +70^\circ\text{C}$	1.3
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	60	$^\circ\text{C/W}$
Total Power Dissipation (Note 5)	P_D	17.3	W
Thermal Resistance, Junction to Case (Note 5)	$R_{\theta JC}$	7.2	$^\circ\text{C/W}$
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
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV_{DSS}	-60	—	—	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}	—	—	-1	μA	$V_{DS} = -60\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(th)}$	-1	—	-3	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	—	28	m Ω	$V_{GS} = -10\text{V}, I_D = -5\text{A}$
		—	—	35		$V_{GS} = -4.5\text{V}, I_D = -4\text{A}$
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	$V_{GS} = 0\text{V}, I_S = -1\text{A}$
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	2569	—	pF	$V_{DS} = -30\text{V}, V_{GS} = 0\text{V},$ $f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	179	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	143	—	pF	
Gate Resistance	R_g	—	8	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ($V_{GS} = -4.5\text{V}$)	Q_g	—	26.5	—	nC	$V_{DS} = -30\text{V}, I_D = -5\text{A}$
Total Gate Charge ($V_{GS} = -10\text{V}$)	Q_g	—	53.1	—	nC	
Gate-Source Charge	Q_{gs}	—	7.1	—	nC	
Gate-Drain Charge	Q_{gd}	—	12.6	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	6	—	ns	$V_{GS} = -10\text{V}, V_{DS} = -30\text{V},$ $R_G = 3\Omega, I_D = -5\text{A}$
Turn-On Rise Time	t_r	—	7.1	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	110	—	ns	
Turn-Off Fall Time	t_f	—	62	—	ns	
Body Diode Reverse Recovery Time	t_{rr}	—	20	—	nS	$I_F = -5\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{rr}	—	14	—	nC	

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square pad layout.
6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.

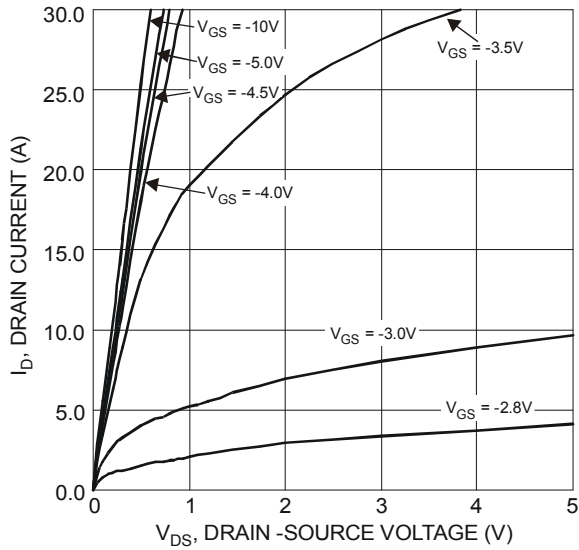


Figure 1 Typical Output Characteristics

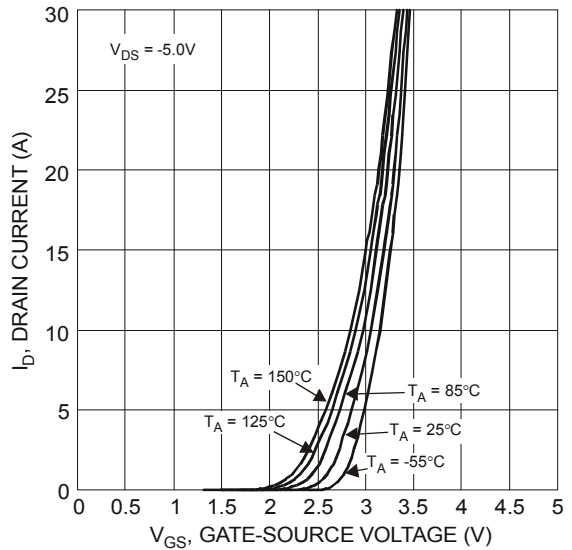


Figure 2 Typical Transfer Characteristics

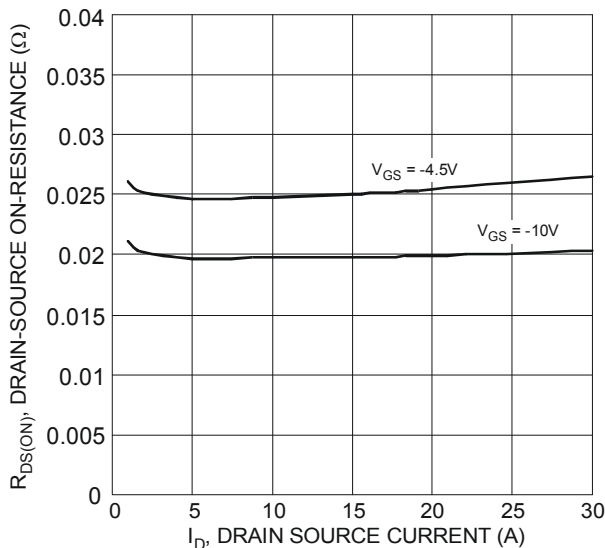


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

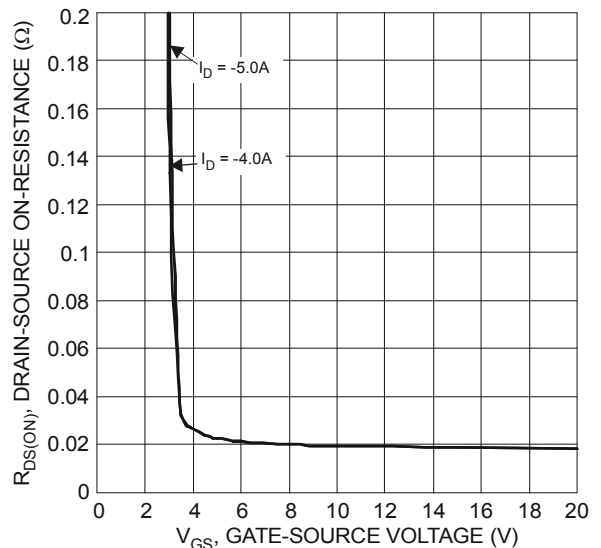


Figure 4 Typical Transfer Characteristics

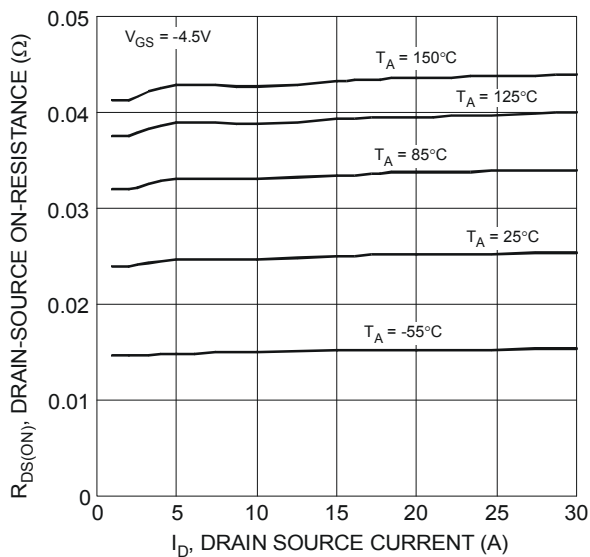


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

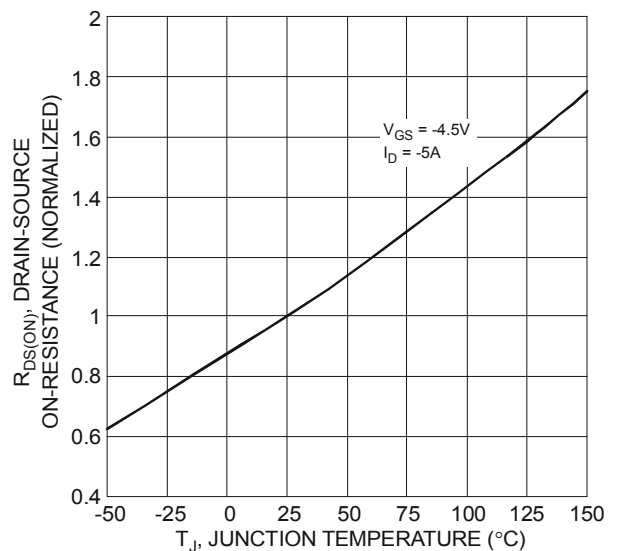


Figure 6 On-Resistance Variation with Temperature

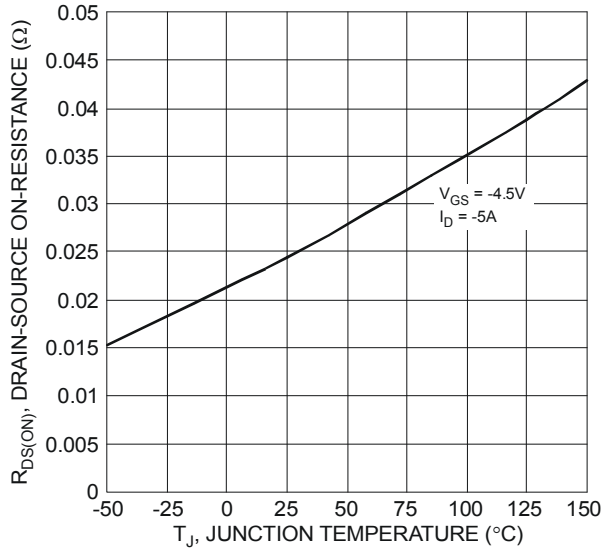


Figure 7 On-Resistance Variation with Temperature

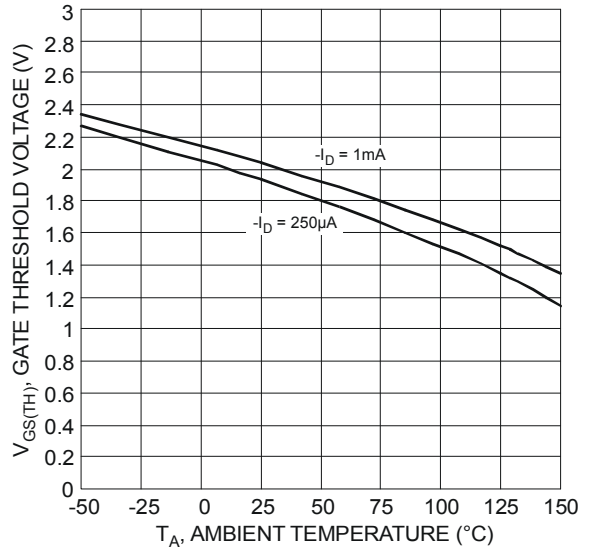


Figure 8 Gate Threshold Variation vs. Ambient Temperature

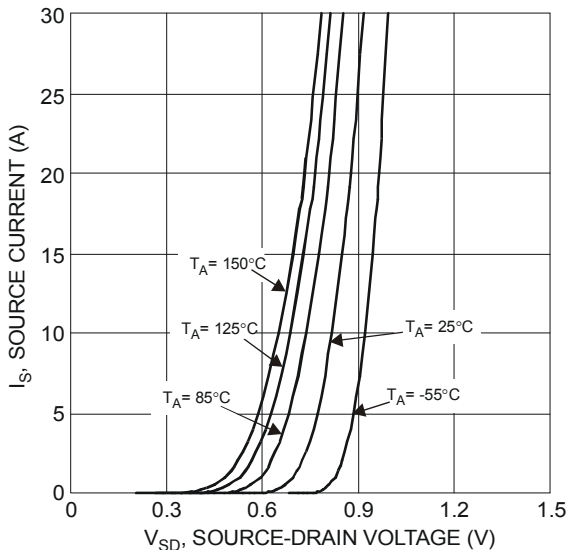


Figure 9 Diode Forward Voltage vs. Current

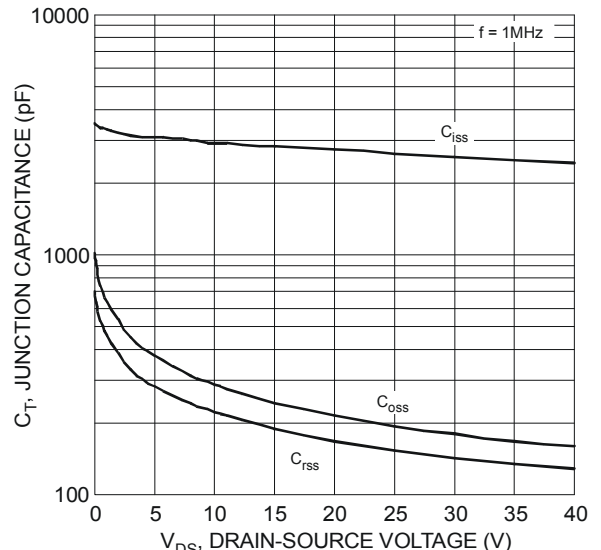


Figure 10 Typical Junction Capacitance

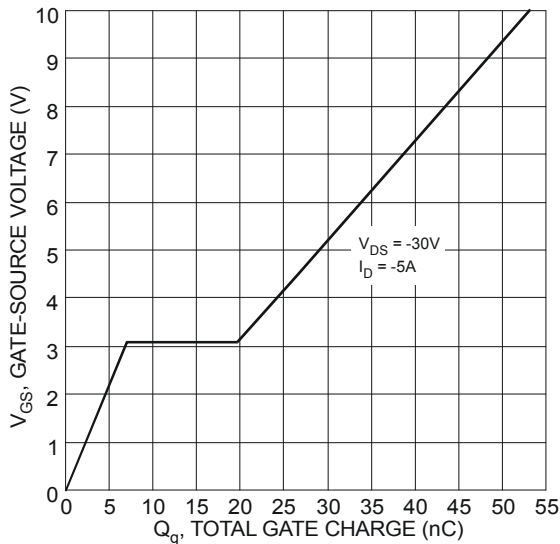


Figure 11 Gate-Charge Characteristics

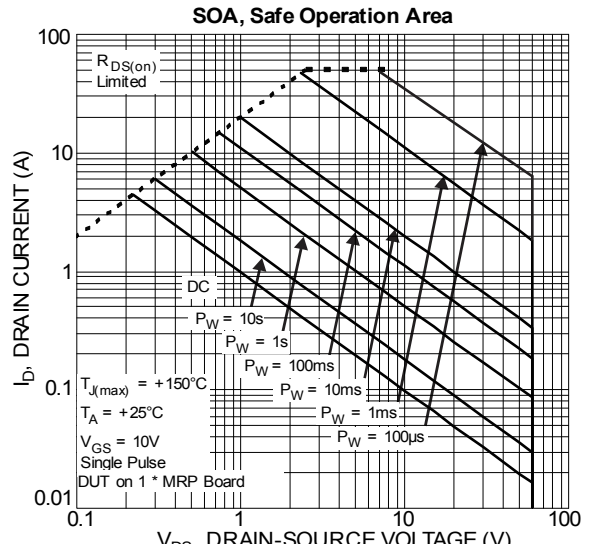


Figure 12 SOA, Safe Operation Area

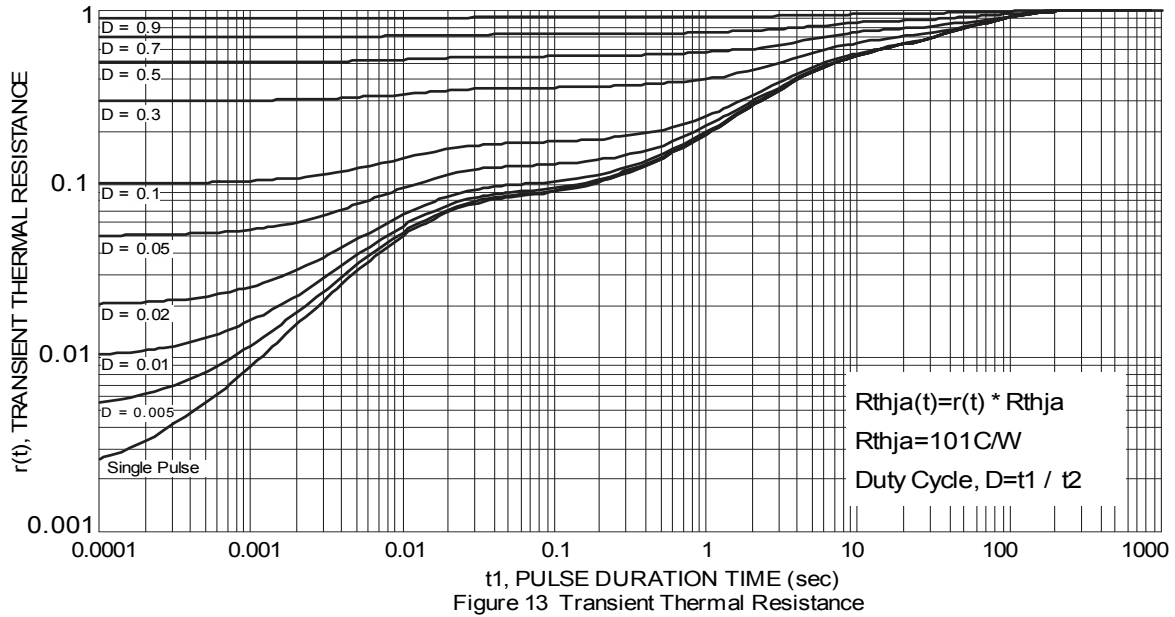
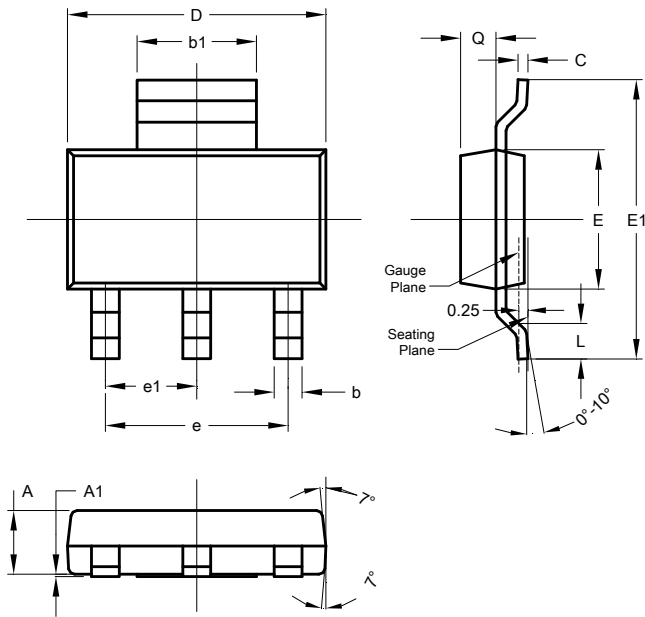


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

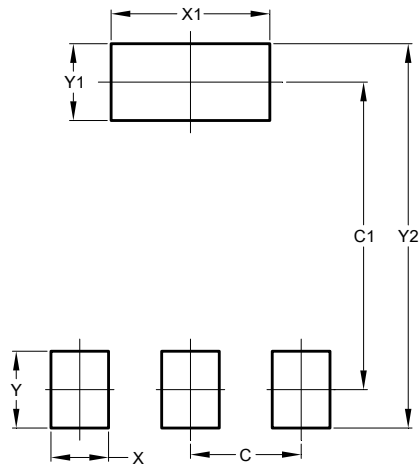
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
C	2.30
C1	6.40
X	1.20
X1	3.30
Y	1.60
Y1	1.60
Y2	8.00

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