

## Product Summary

<b>BV<sub>DSS</sub></b>	<b>R<sub>DS(ON)</sub> Max</b>	<b>I<sub>D</sub></b> T <sub>A</sub> = +25°C
-60V	10Ω @ V <sub>GS</sub> = -5V	-180mA

## Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage
- 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)**

## Description and Applications

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.

- General Purpose Interfacing Switch
- Power Management Functions
- Analog Switch

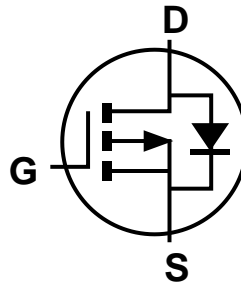
## Mechanical Data

- Case: SOT23
- Case Material: UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish (Lead Free Plating). Solderable per MIL-STD-202, Method 208 (e3)
- Terminal Connections: See Diagram
- Weight: 0.008 grams (Approximate)

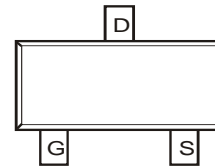


SOT23

Top View



Equivalent Circuit



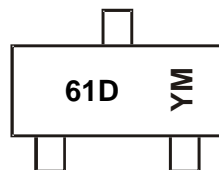
Top View

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP610DL-7	SOT23	3,000/Tape & Reel
DMP610DL-13	SOT23	10,000/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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



61D = Product Type Marking Code  
 YM = Date Code Marking for SAT (Shanghai Assembly/ Test site)  
 Y or Ȳ = Year (ex: E = 2017)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2016	2017	2018	2019	2020	2021	2022	2023
Code	D	E	F	G	H	I	J	K

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	$V_{DSS}$	-60	V
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	V
Continuous Drain Current (Note 6) $V_{GS} = -5\text{V}$	$I_D$	$T_A = +25^\circ\text{C}$	-180
		$T_A = +70^\circ\text{C}$	-130
Maximum Continuous Body Diode Forward Current (Note 6)	$I_S$	-0.5	A
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)	$I_{DM}$	-1.2	A

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	$P_D$	310	mW
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	Steady State	405
Total Power Dissipation (Note 6)		$P_D$	500
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	Steady State	251
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 7)						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-60	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	-1	$\mu\text{A}$	$V_{DS} = -60\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS</b> (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.8	—	-2.0	V	$V_{DS} = V_{GS}, I_D = -1\text{mA}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	10	$\Omega$	$V_{GS} = -5\text{V}, I_D = -0.1\text{A}$
Forward Transconductance	$g_{FS}$	—	0.25	—	S	$V_{DS} = -25\text{V}, I_D = -0.1\text{A}$
<b>DYNAMIC CHARACTERISTICS</b> (Note 8)						
Input Capacitance	$C_{ISS}$	—	24.6	—	pF	$V_{DS} = -25\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{OSS}$	—	4.8	—	pF	
Reverse Transfer Capacitance	$C_{RSS}$	—	2.8	—	pF	
Gate Resistance	$R_G$	—	2,000	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ( $V_{GS} = -4.5\text{V}$ )	$Q_G$	—	280	—	pC	$V_{DS} = -10\text{V}, I_D = -100\text{mA}$
Total Gate Charge ( $V_{GS} = -10\text{V}$ )	$Q_G$	—	560	—	pC	
Gate-Source Charge	$Q_{GS}$	—	90	—	pC	
Gate-Drain Charge	$Q_{GD}$	—	77	—	pC	
Turn-On Delay Time	$t_{D(ON)}$	—	2.8	—	ns	$V_{DD} = -30\text{V}, I_D = -0.27\text{A}, R_{GEN} = 50\Omega, V_{GS} = -10\text{V}$
Turn-On Rise Time	$t_R$	—	2.6	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	11.1	—	ns	
Turn-Off Fall Time	$t_F$	—	7.2	—	ns	

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout.
  - Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

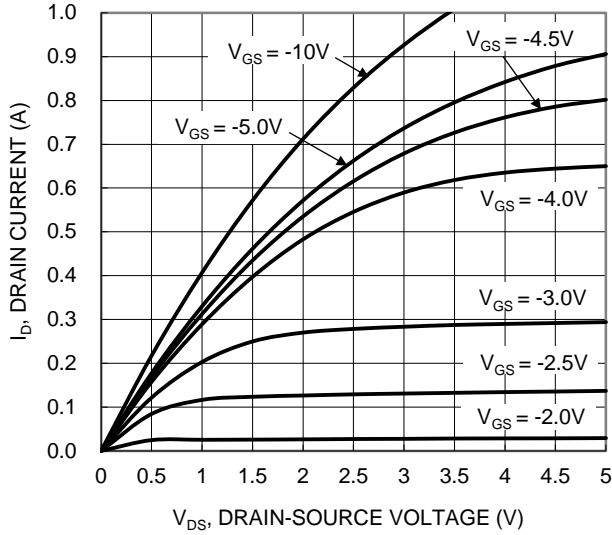


Figure 1. Typical Output Characteristic

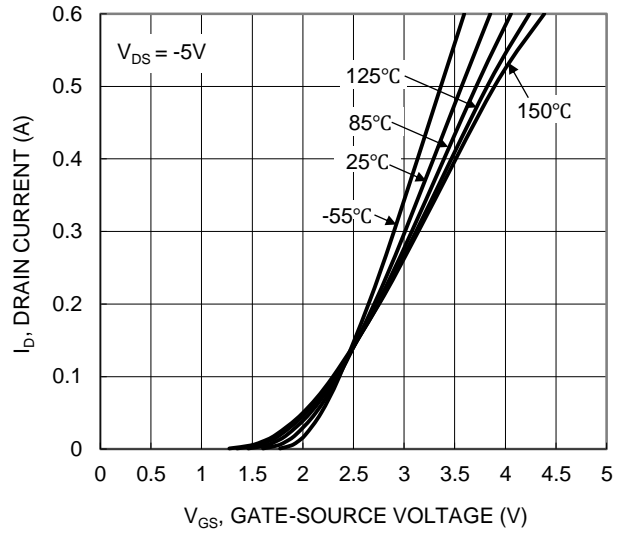


Figure 2. Typical Transfer Characteristic

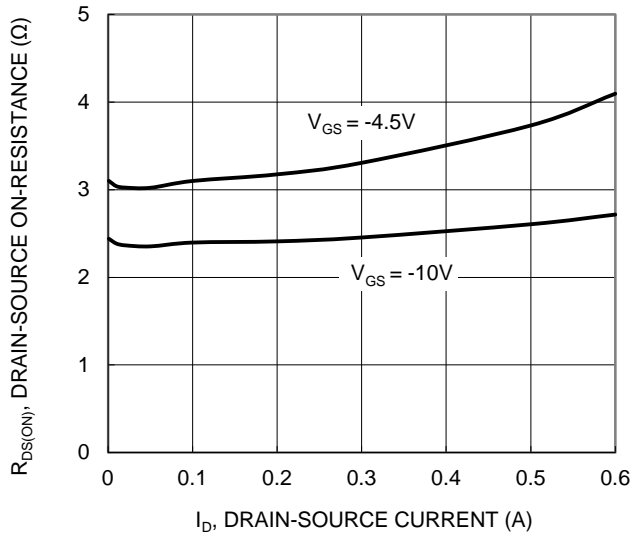


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

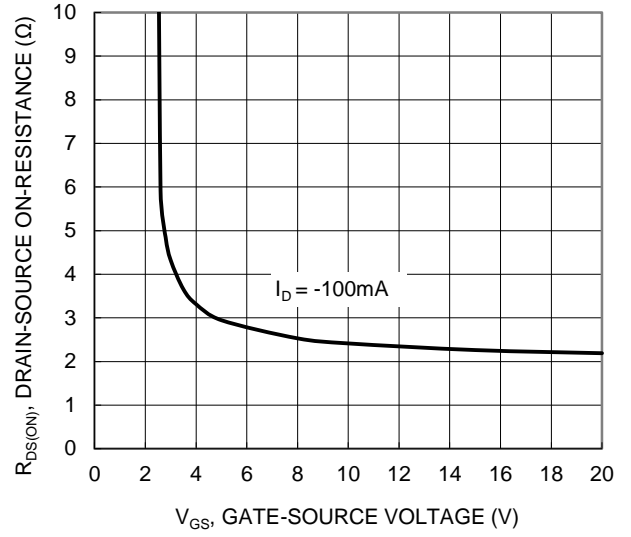


Figure 4. Typical Transfer Characteristic

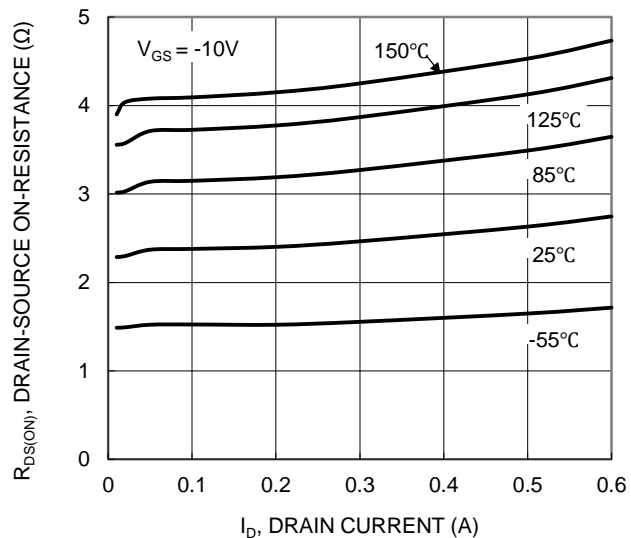


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

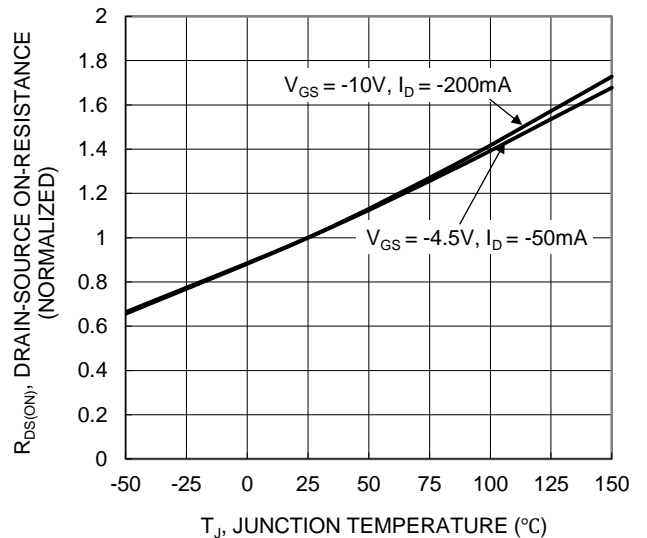
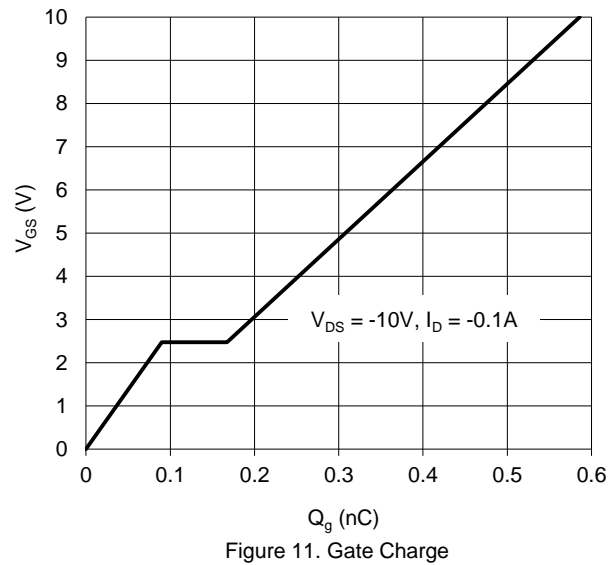
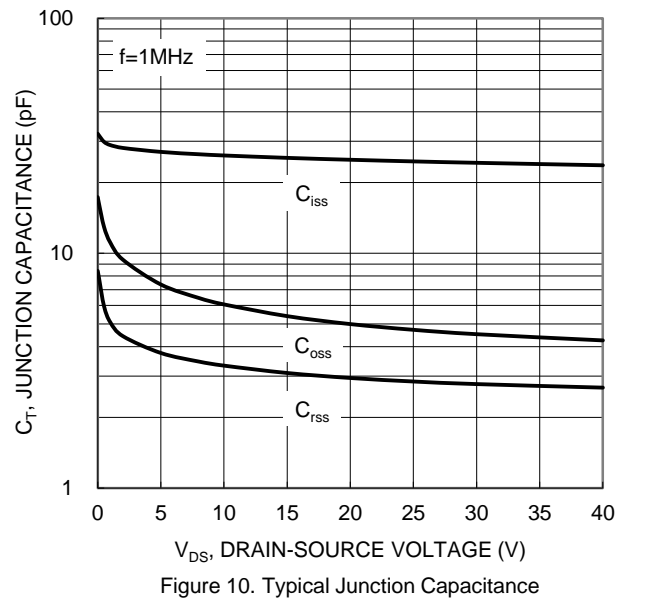
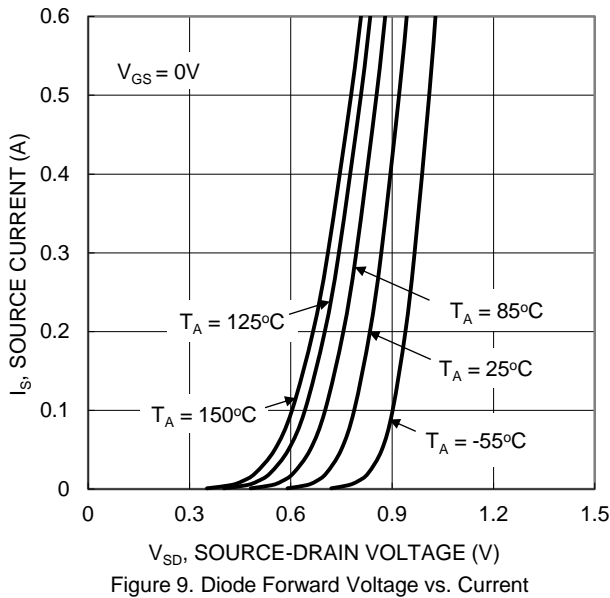
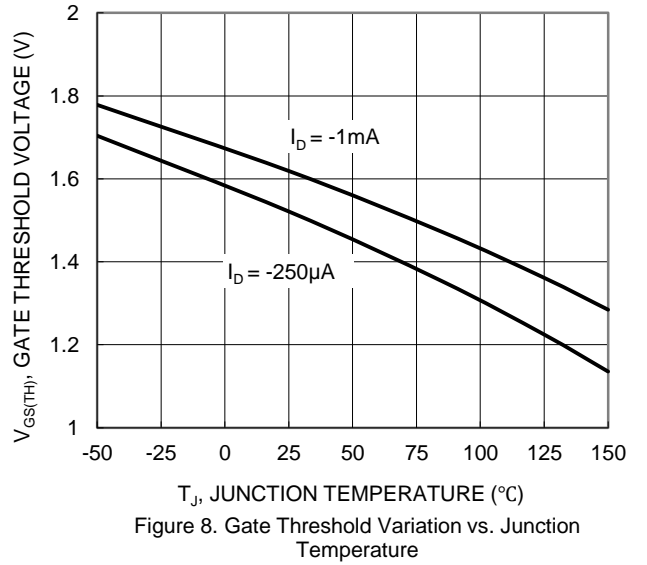
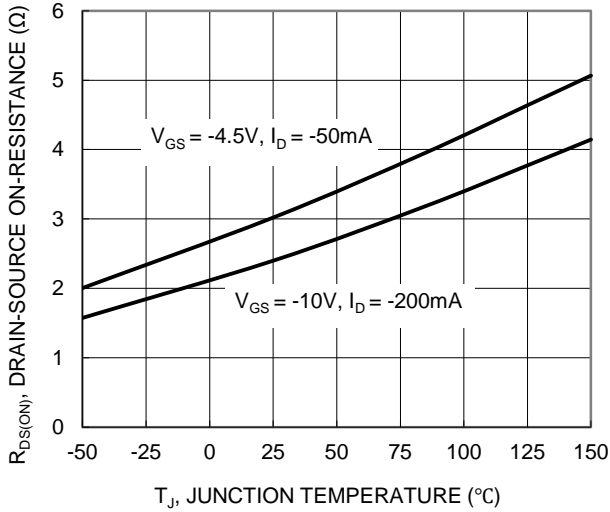


Figure 6. On-Resistance Variation with Temperature



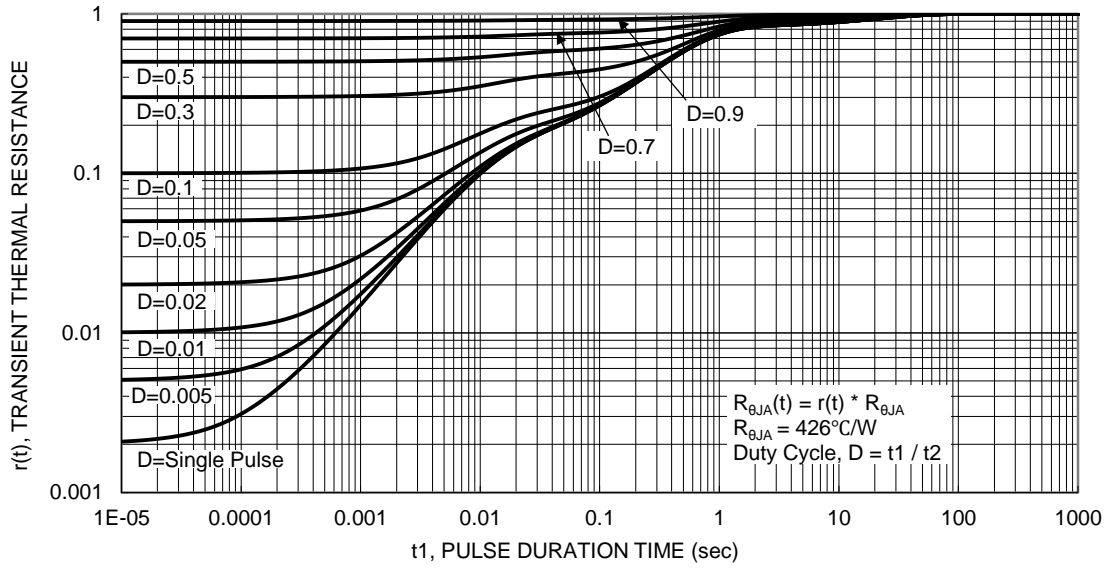
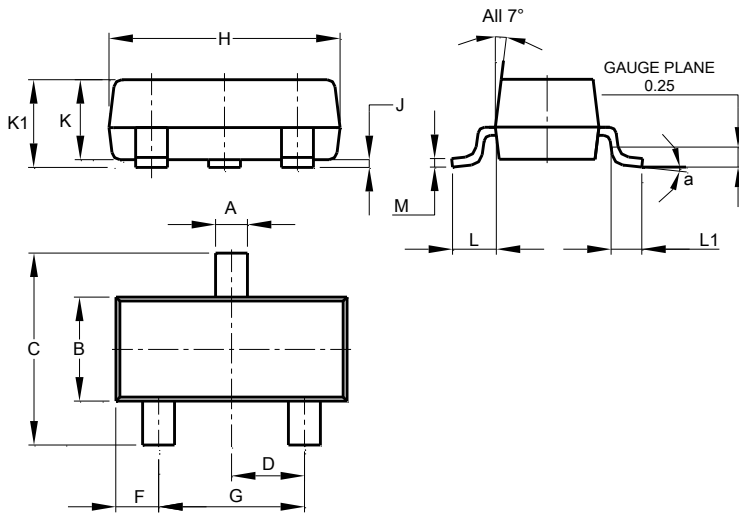


Figure 12. Transient Thermal Resistance

**Package Outline Dimensions**

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

SOT23

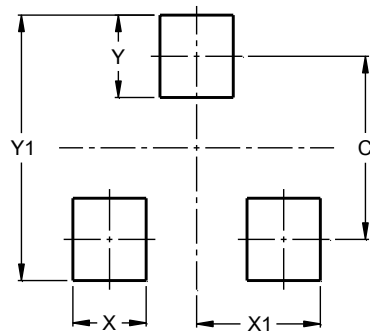


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

**Suggested Pad Layout**

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

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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