

## Product Summary

V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> max	Package	I <sub>D</sub> max T <sub>A</sub> = +25°C
-20V	60mΩ @ V <sub>GS</sub> = -4.5V	SOT-23	-4.0A
	90mΩ @ V <sub>GS</sub> = -2.5V		-3.3A

## Features

- 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)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative.**

<https://www.diodes.com/quality/product-definitions/>

## Description and Applications

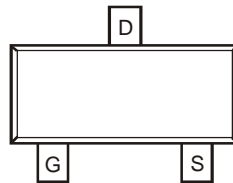
This new generation MOSFET is designed to minimize the on-state resistance (R<sub>DS(on)</sub>) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

## Mechanical Data

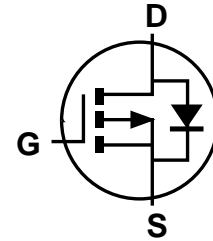
- Case: SOT23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Solderable per MIL-STD-202, Method 208 <sup>Ⓔ3</sup>
- Lead-Free Plating (Matte Tin Finish Annealed over Alloy 42 Lead-Frame).
- Terminal Connections: See Diagram
- Weight: 0.006 grams (Approximate)



Top View



Top View  
Pin Configuration



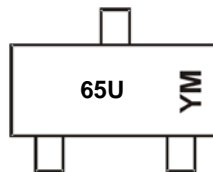
Equivalent Circuit

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2065U-7	SOT23	3000/Tape & Reel
DMP2065U-13	SOT23	10,000/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



65U = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: H = 2020)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2020	2021	2022	2023	2024	2025	2026
Code	H	I	J	K	L	M	N

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	Units
Drain-Source Voltage	$V_{DSS}$	-20	V
Gate-Source Voltage	$V_{GSS}$	$\pm 12$	V
Drain Current (Note 6) $V_{GS} = -4.5\text{V}$	$I_D$	$T_A = +25^\circ\text{C}$ Steady State	-4.0
		$T_A = +70^\circ\text{C}$	-3.0
Pulsed Drain Current (Pulse width $\leq 10\mu\text{s}$ , Duty Cycle $\leq 1\%$ )	$I_{DM}$	-15	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	$P_D$	0.9	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	Steady State	138
Total Power Dissipation (Note 6)		$P_D$	1.5
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	83	$^\circ\text{C/W}$
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	
<b>OFF CHARACTERISTICS (Note 7)</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	$I_{DSS}$	—	—	-1.0	$\mu\text{A}$	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V}$	
Gate-Source Leakage							$I_{GSS}$
<b>ON CHARACTERISTICS (Note 7)</b>							
Gate Threshold Voltage	$V_{GS(th)}$	-0.5	—	-0.9	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	41	60	$\text{m}\Omega$	$V_{GS} = -4.5\text{V}, I_D = -4.2\text{A}$	
			53	90			$V_{GS} = -2.5\text{V}, I_D = -3.4\text{A}$
			72	113			$V_{GS} = -1.8\text{V}, I_D = -2.0\text{A}$
Diode Forward Voltage	$V_{SD}$	—	-0.7	-1.1	V	$V_{GS} = 0\text{V}, I_S = -1\text{A}$	
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>							
Input Capacitance	$C_{iss}$	—	808	—	pF	$V_{DS} = -15\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$	
Output Capacitance	$C_{oss}$	—	85	—	pF		
Reverse Transfer Capacitance	$C_{rss}$	—	77	—	pF		
Gate Resistance	$R_G$	—	15.2	—	$\Omega$	$V_{GS} = 0\text{V}, V_{DS} = 0\text{V}, f = 1.0\text{MHz}$	
Total Gate Charge	$Q_g$	—	10.2	—	nC	$V_{GS} = -4.5\text{V}, V_{DS} = -4\text{V}, I_D = -3.5\text{A}$	
Gate-Source Charge	$Q_{gs}$	—	1.3	—	nC		
Gate-Drain Charge	$Q_{gd}$	—	2.2	—	nC		
Turn-On Delay Time	$t_{D(on)}$	—	10.8	—	ns	$V_{DS} = -4\text{V}, V_{GS} = -4.5\text{V},$ $R_L = 4\Omega, R_G = 6\Omega, I_D = -1\text{A}$	
Turn-On Rise Time	$t_r$	—	13.7	—	ns		
Turn-Off Delay Time	$t_{D(off)}$	—	79.3	—	ns		
Turn-Off Fall Time	$t_f$	—	34.7	—	ns		

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1in. square copper plate.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

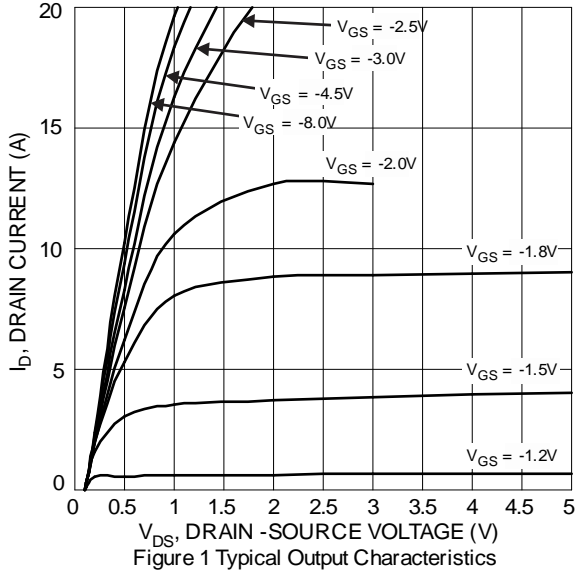


Figure 1 Typical Output Characteristics

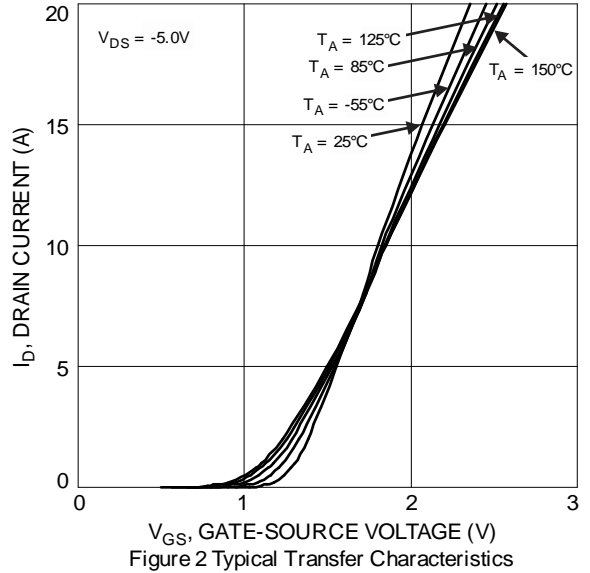


Figure 2 Typical Transfer Characteristics

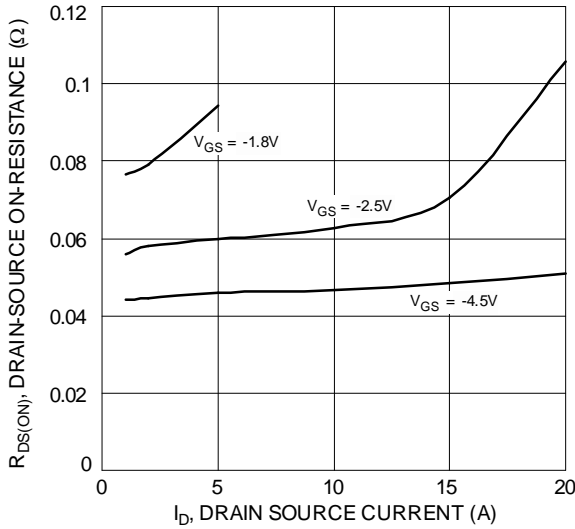


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

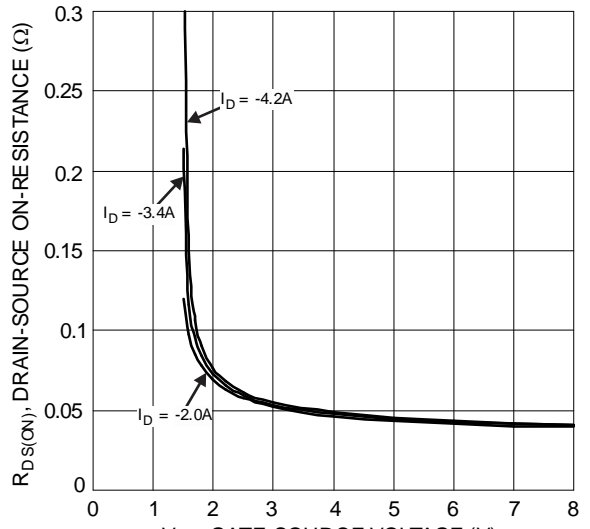


Figure 4 Typical Transfer Characteristics

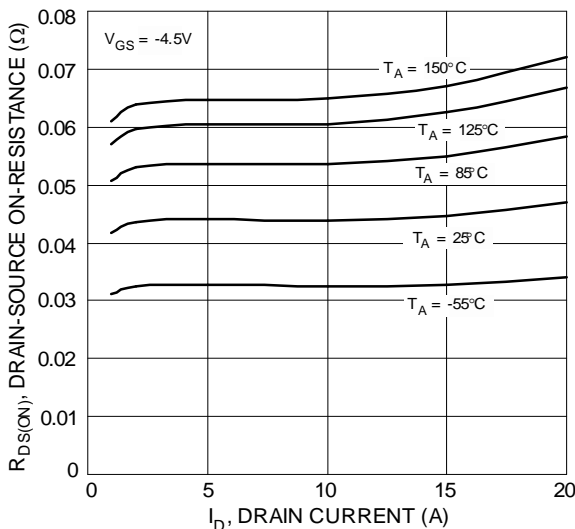


Figure 5 Typical On-Resistance vs. Drain Current and Junction Temperature

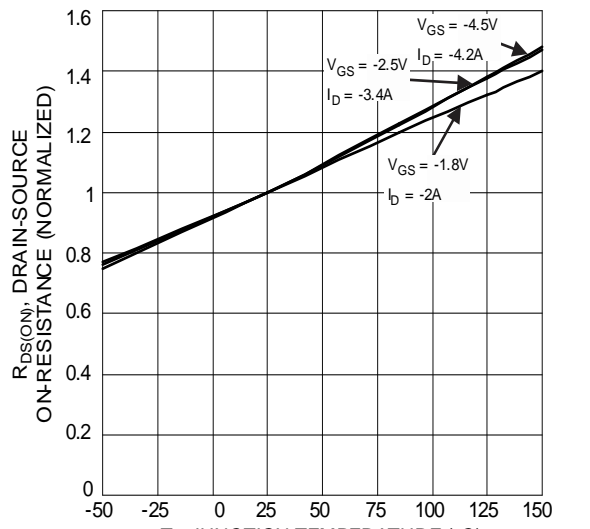


Figure 6 On-Resistance Variation with Junction Temperature

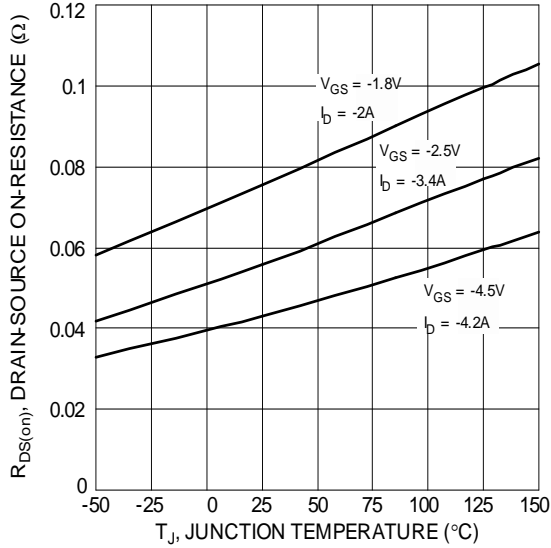


Figure 7 On-Resistance Variation with Junction Temperature

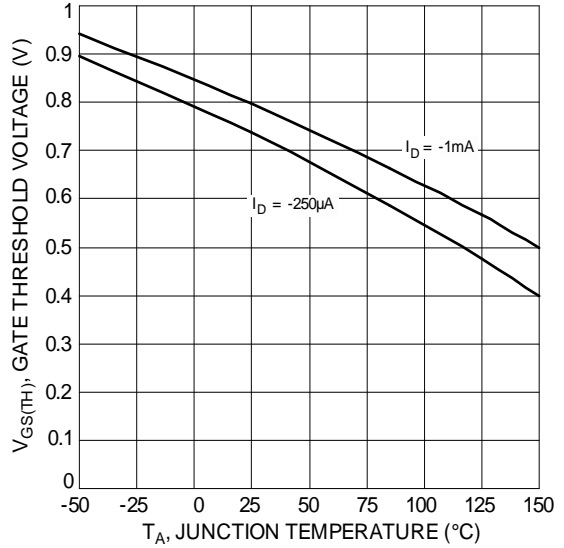


Figure 8 Gate Threshold Variation vs. Junction Temperature

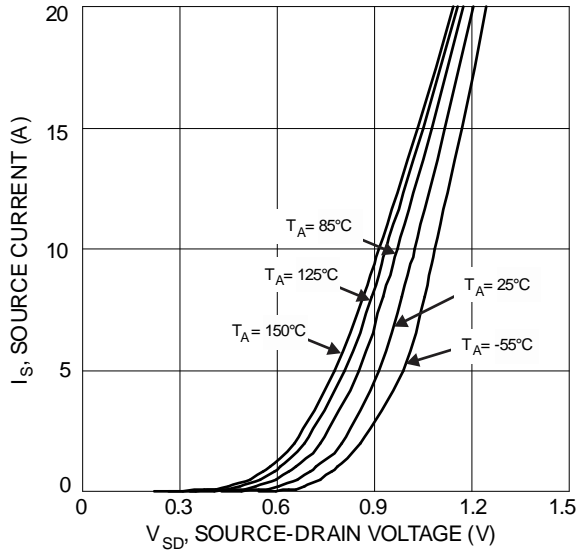


Figure 9 Diode Forward Voltage vs. Current

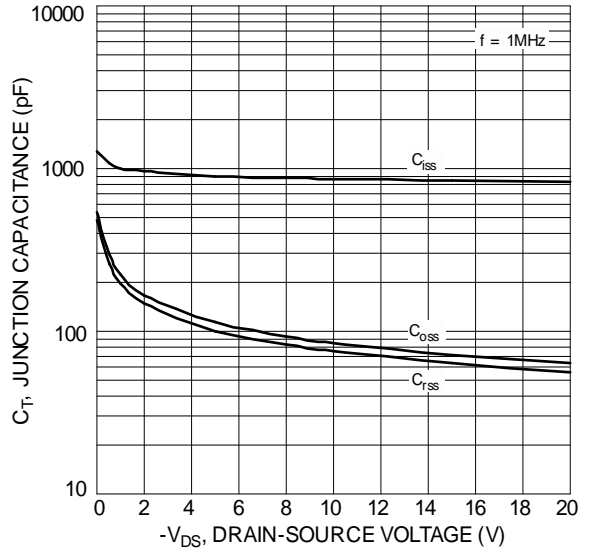


Figure 10 Typical Junction Capacitance

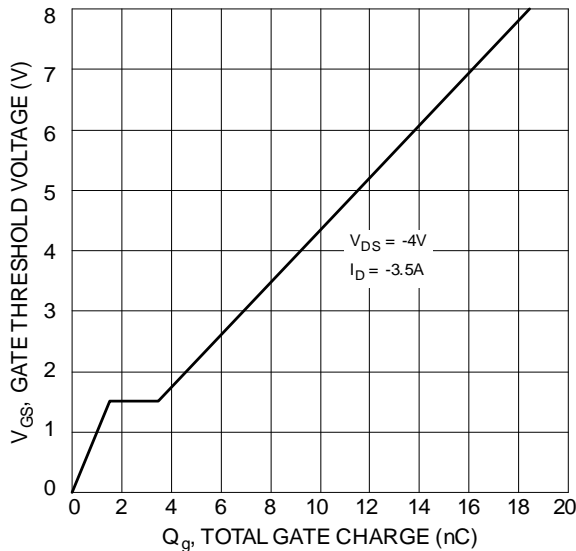


Figure 11 Gate Charge

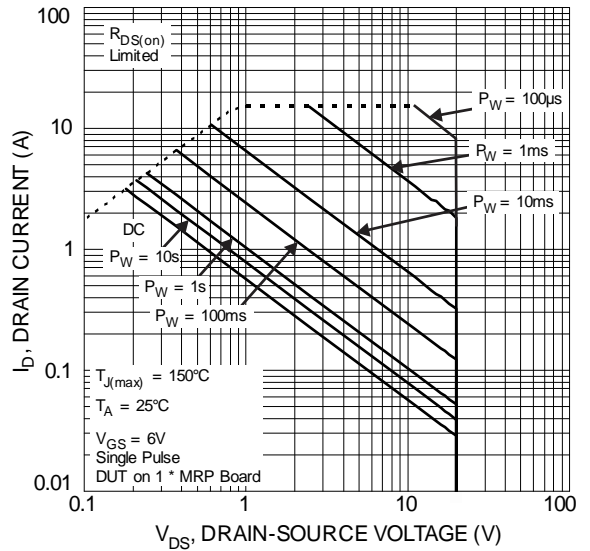
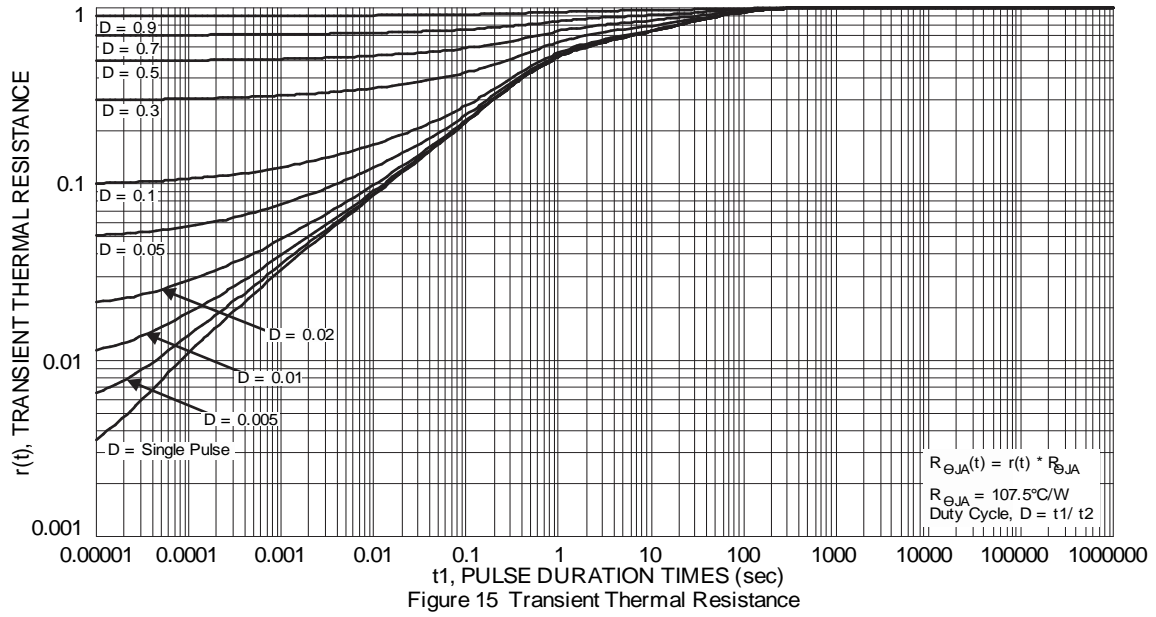


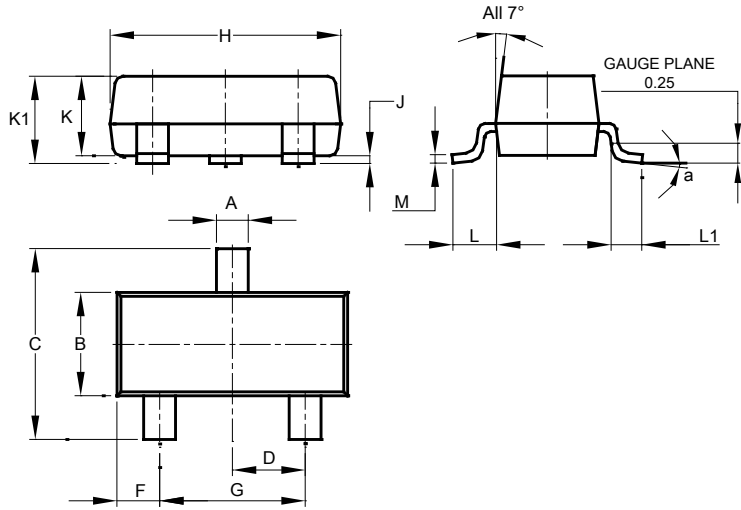
Figure 12 SOA, Safe Operation Area



**Package Outline Dimensions**

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

**SOT23**

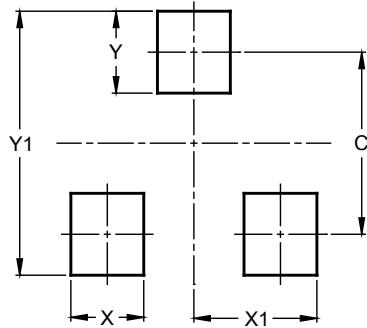


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

**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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