

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>A</sub> = +25°C
60V	2Ω @ V <sub>GS</sub> = 5V	380mA
	2.5Ω @ V <sub>GS</sub> = 2.5V	340mA

## Description

This 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.

## Applications

- Motor controls
- Power-management functions
- Backlighting

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected up to 2kV
- 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-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.
- This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. <https://www.diodes.com/quality/product-definitions/>

## Mechanical Data

- Package: SOT23
- Package 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 (e3)
- Weight: 0.008 grams (Approximate)

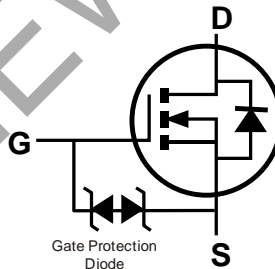


ESD protected up to 2kV

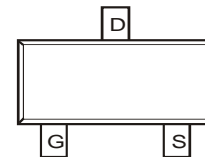
SOT23



Top View



Equivalent Circuit



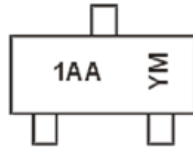
Top View

## Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMN61D9U-7	SOT23	3000	Tape & Reel
DMN61D9U-13	SOT23	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



1AA = Product Type Marking Code  
 YM = Date Code Marking  
 Y or Ȳ = Year (ex: L = 2024)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2015	-	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Code	C	-	L	M	N	P	R	S	T	U	V	W
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>	60	V
Gate-Source Voltage		V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 5.0V	Steady State	I <sub>D</sub>	380 300	mA
	t < 5s	I <sub>D</sub>	430 340	mA
Maximum Continuous Body Diode Forward Current (Note 6)		I <sub>S</sub>	0.4	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) (Note 6)		I <sub>DM</sub>	1.2	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>	370	mW
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	351	°C/W
	t < 5s		292	
Total Power Dissipation (Note 6)		P <sub>D</sub>	540	mW
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	221	°C/W
	t < 5s		197	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

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.

**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	$BV_{DSS}$	60	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	1.0	$\mu A$	$V_{DS} = 60V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 10$	$\mu A$	$V_{GS} = \pm 20V, V_{DS} = 0V$
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	0.5	—	1.0	V	$V_{DS} = 10V, I_D = 250\mu A$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	1.2	2.0	$\Omega$	$V_{GS} = 5.0V, I_D = 0.05A$
			1.6	2.5		$V_{GS} = 2.5V, I_D = 0.05A$
			2.5	3.5		$V_{GS} = 1.8V, I_D = 0.05A$
Forward Transconductance	$ Y_{fs} $	200	—	—	mS	$V_{DS} = 10V, I_D = 0.2A$
Diode Forward Voltage	$V_{SD}$	—	0.75	1.4	V	$V_{GS} = 0V, I_S = 115mA$
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	$C_{iss}$	—	28.5	—	pF	$V_{DS} = 30V, V_{GS} = 0V$ $f = 1.0MHz$
Output Capacitance	$C_{oss}$	—	3.9	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	2.5	—	pF	$f = 1MHz, V_{GS} = 0V, V_{DS} = 0V$
Gate Resistance	$R_g$	—	65	—	$\Omega$	
Total Gate Charge	$Q_g$	—	0.4	—	nC	$V_{GS} = 4.5V, V_{DS} = 10V,$ $I_D = 250mA$
Gate-Source Charge	$Q_{gs}$	—	0.1	—	nC	
Gate-Drain Charge	$Q_{gd}$	—	0.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	2.1	—	ns	$V_{DD} = 30V, V_{GS} = 10V,$ $R_G = 25\Omega, I_D = 200mA$
Turn-On Rise Time	$t_R$	—	1.8	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	14.4	—	ns	
Turn-Off Fall Time	$t_F$	—	8.4	—	ns	

Notes: 7. Short duration pulse test used to minimize self-heating effect.  
8. Guaranteed by design. Not subject to product testing.

NOT RECOMMENDED FOR NEW DESIGN

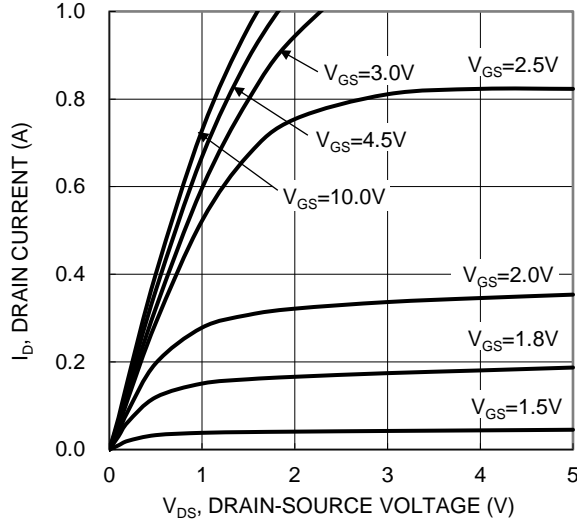


Figure 1. Typical Output Characteristic

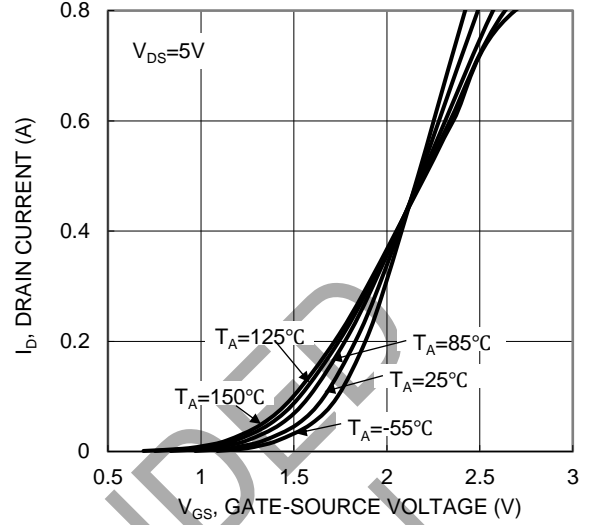


Figure 2. Typical Transfer Characteristic

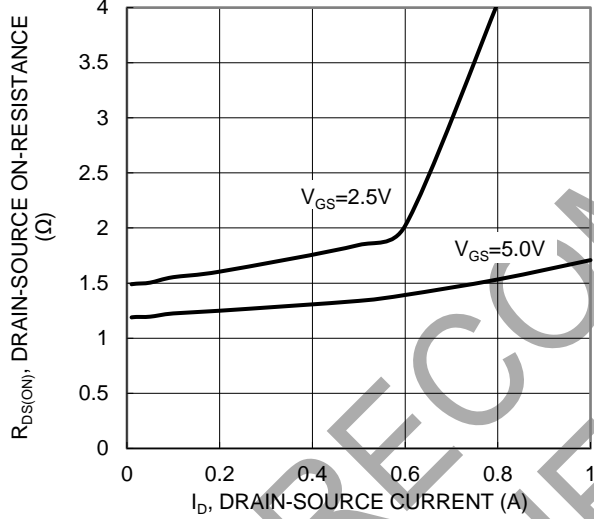


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

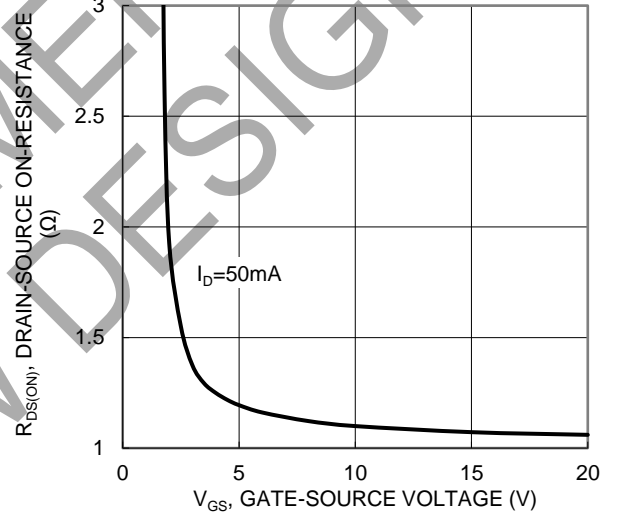


Figure 4. Typical Transfer Characteristic

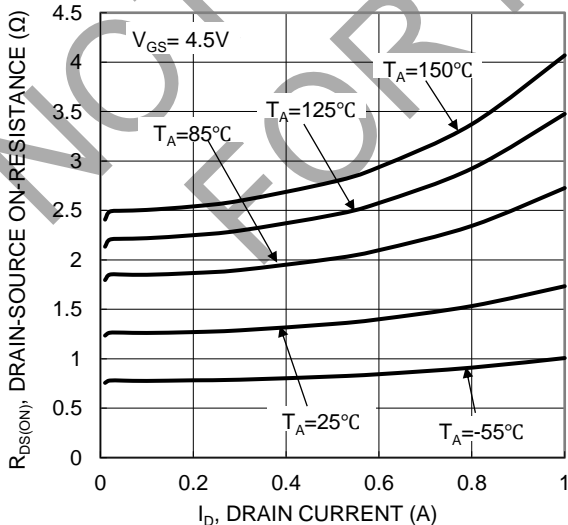


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

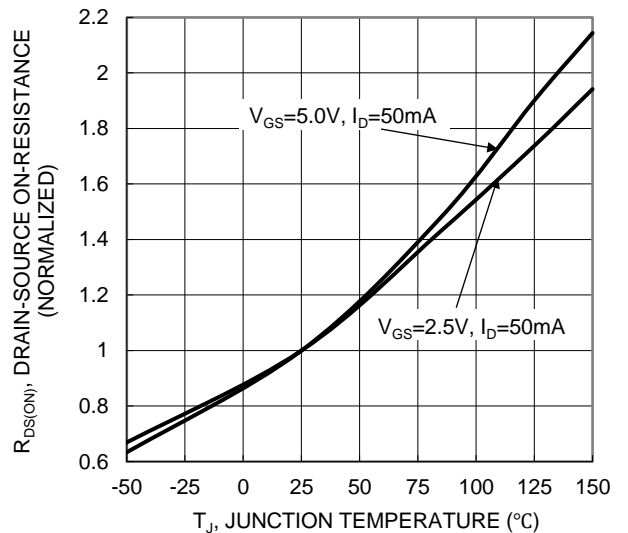


Figure 6. On-Resistance Variation with Junction Temperature

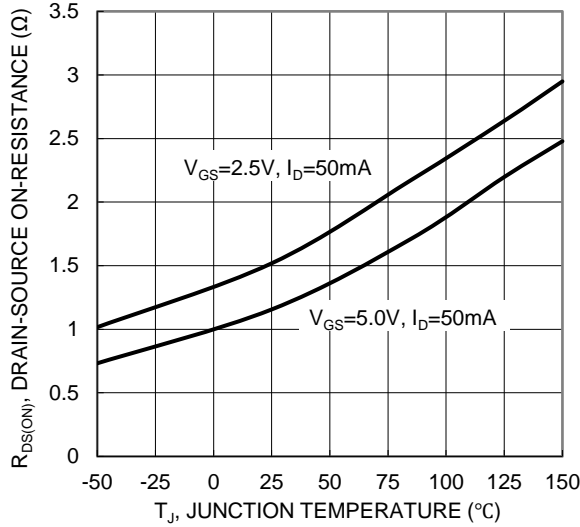


Figure 7. On-Resistance Variation with Junction Temperature

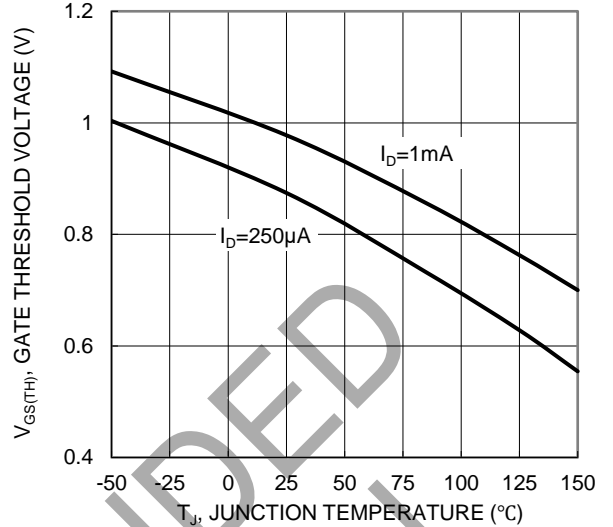


Figure 8. Gate Threshold Variation vs. Junction Temperature

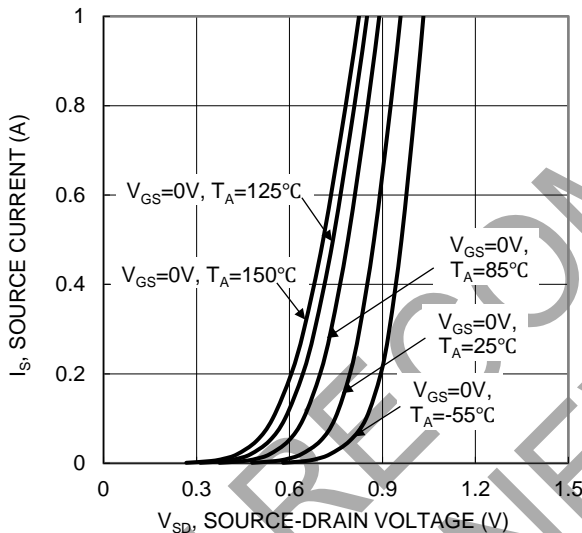


Figure 9. Diode Forward Voltage vs. Current

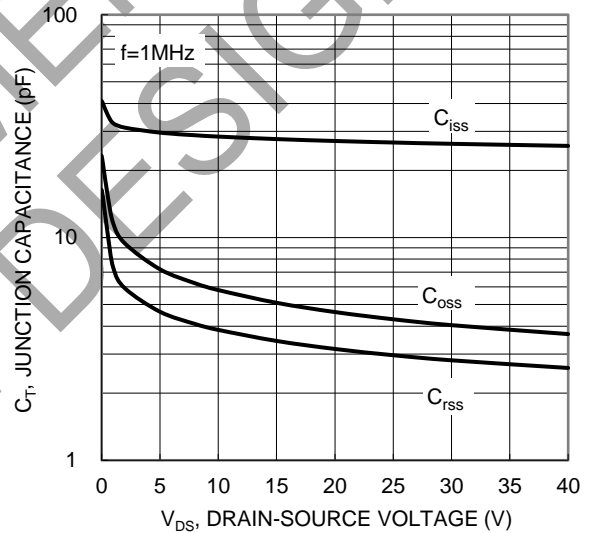


Figure 10. Typical Junction Capacitance

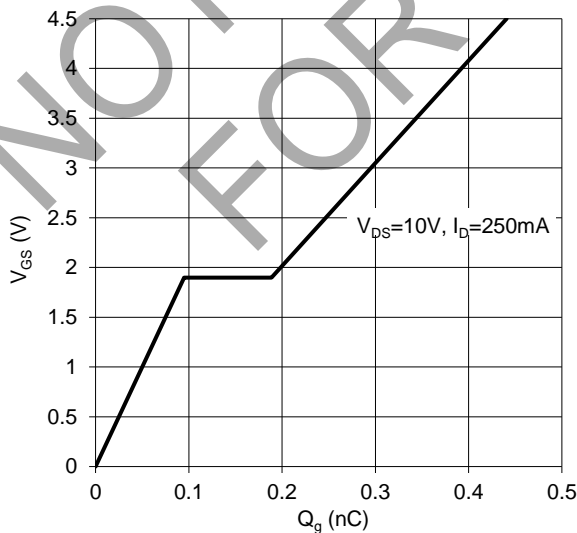


Figure 11. Gate Charge

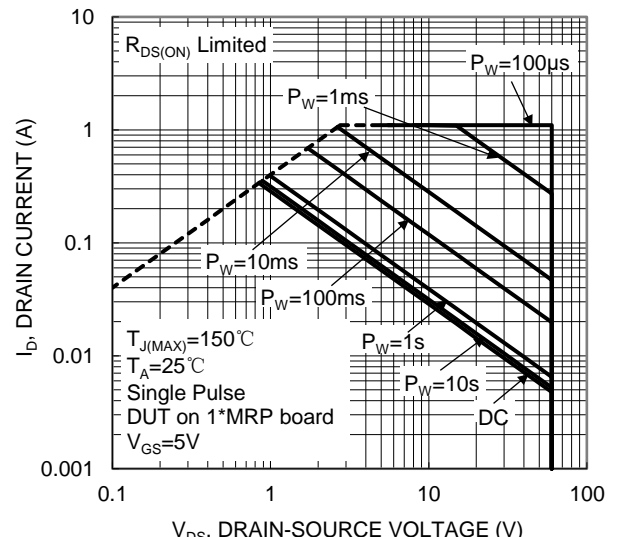


Figure 12. SOA, Safe Operation Area

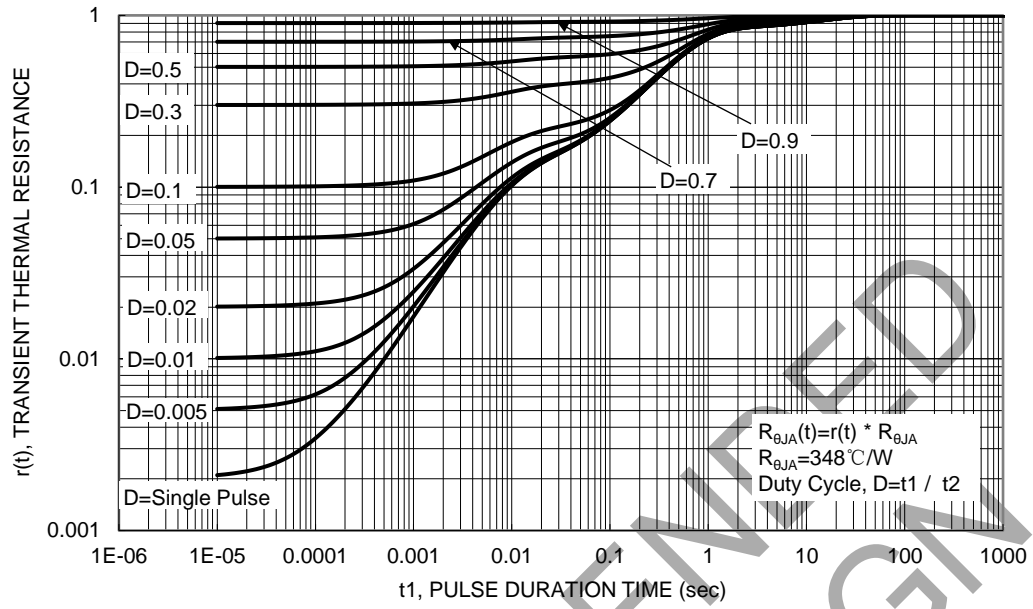


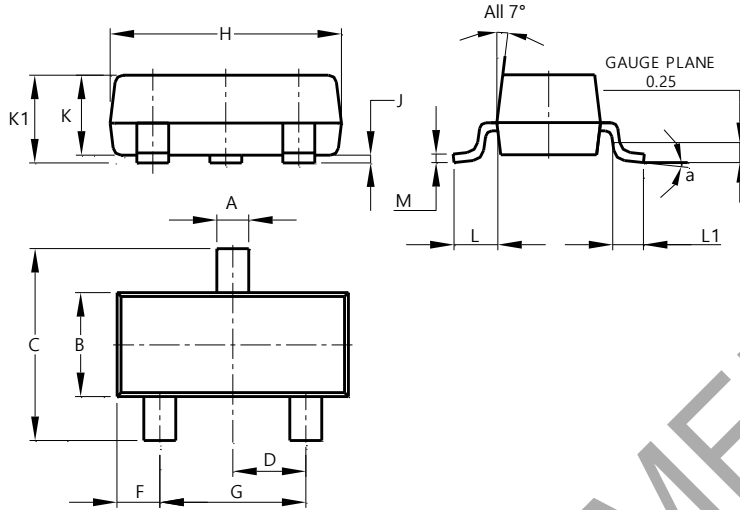
Figure 13. Transient Thermal Resistance

NOT RECOMMENDED FOR NEW DESIGN

## Package Outline Dimensions

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

SOT23

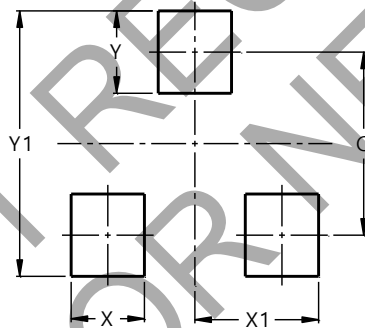


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

## 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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