

## Product Summary

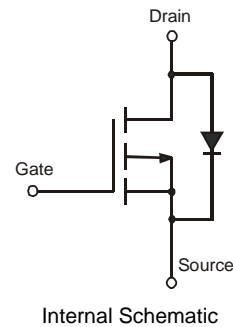
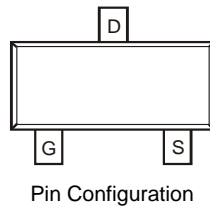
$V_{(BR)DSS}$	$R_{DS(on) max}$	$I_D$ $T_A = +25^\circ C$
-20V	95mΩ @ $V_{GS} = -4.5V$	3.0A
	130mΩ @ $V_{GS} = -2.5V$	2.5A

## Description

This new generation MOSFET has been 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.

## Applications

- DC-DC Converters
- Power Management Functions
- Analog Switch



## Features and Benefits

- Low On-Resistance
- 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)**
- **Qualified to AEC-Q101 standards for High Reliability**

## Mechanical Data

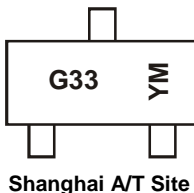
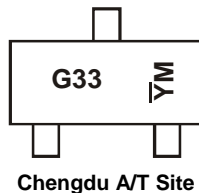
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.0072 grams (approximate)

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMG3413L-7	SOT23	3,000/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



G33 = Marking Code  
 YM = Date Code Marking for SAT (Shanghai Assembly/ Test site)  
 ȲM = Date Code Marking for CAT (Chengdu Assembly/ Test site)  
 Y or Ȳ = Year (ex: A = 2013)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
Code	X	Y	Z	A	B	C	D	E	F

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	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	0.7	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	184	°C/W
	t < 10s	115	
Total Power Dissipation (Note 6)	P <sub>D</sub>	1.3	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	94	°C/W
	t < 10s	61	
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	25	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V <sub>DSS</sub>	-20	V
Gate-Source Voltage	V <sub>GSS</sub>	±8	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = -4.5V	Steady State	T <sub>A</sub> = +25°C	3.0
		T <sub>A</sub> = +70°C	2.4
Continuous Drain Current (Note 6) V <sub>GS</sub> = -4.5V	t < 10s	T <sub>A</sub> = +25°C	3.7
		T <sub>A</sub> = +70°C	2.9
Continuous Drain Current (Note 6) V <sub>GS</sub> = -2.5V	Steady State	T <sub>A</sub> = +25°C	2.5
		T <sub>A</sub> = +70°C	2.0
Continuous Drain Current (Note 6) V <sub>GS</sub> = -2.5V	t < 10s	T <sub>A</sub> = +25°C	3.2
		T <sub>A</sub> = +70°C	2.5
Maximum Continuous Body Diode Forward Current (Note 6)	I <sub>S</sub>	1.9	A
Pulsed Drain Current (10μs pulse, duty cycle = 1%)	I <sub>DM</sub>	20	A

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-1.0	μA	V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.6	-0.55	-1.3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	73	95	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.0A
			95	130		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -2.6A
			146	190		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -1A
Forward Transfer Admittance	Y <sub>fs</sub>	—	8	-	S	V <sub>DS</sub> = -5V, I <sub>D</sub> = -3A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.8	-1.25	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	857	—	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	54	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	49	—	pF	
Gate Resistance	R <sub>g</sub>	—	12.3	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge	Q <sub>g</sub>	—	9.0	—	nC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -15V, I <sub>D</sub> = -4A
Gate-Source Charge	Q <sub>gs</sub>	—	1.6	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	1.1	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	9.7	—	ns	V <sub>DS</sub> = -15V, V <sub>GS</sub> = -10V, R <sub>L</sub> = 15Ω, R <sub>G</sub> = 6.0Ω, I <sub>D</sub> = -1A
Turn-On Rise Time	t <sub>r</sub>	—	17.7	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	268.8	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	64.2	—	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 vias to bottom layer 1inch square copper plate
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

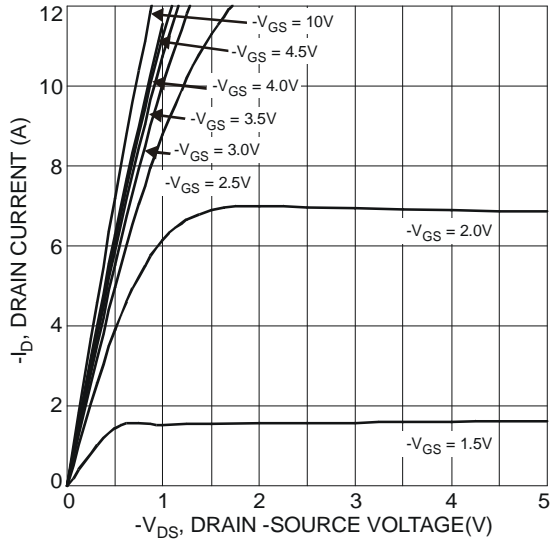


Fig. 1 Typical Output Characteristics

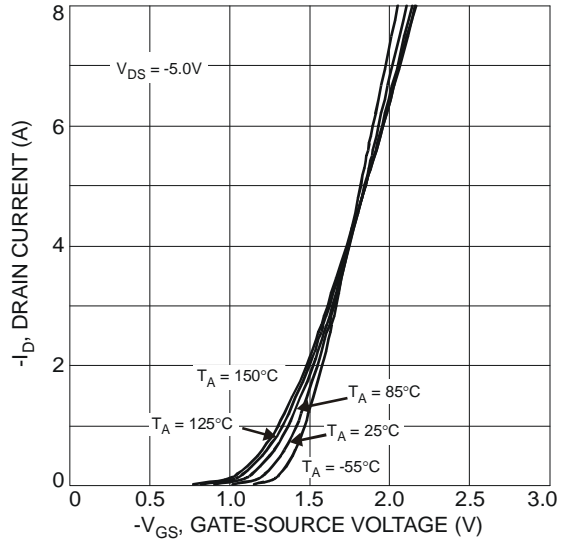


Fig. 2 Typical Transfer Characteristics

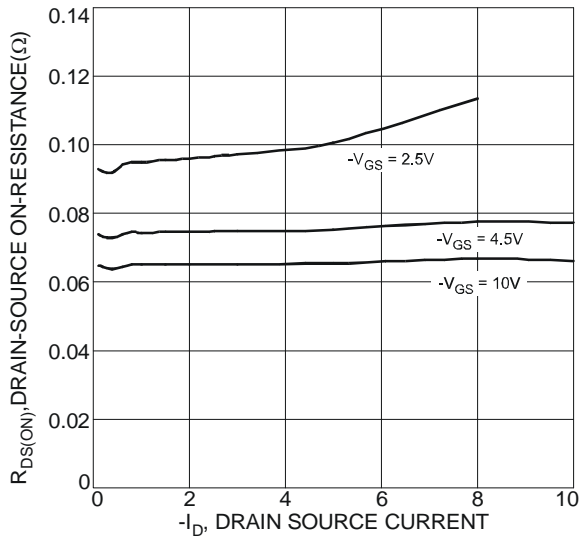


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

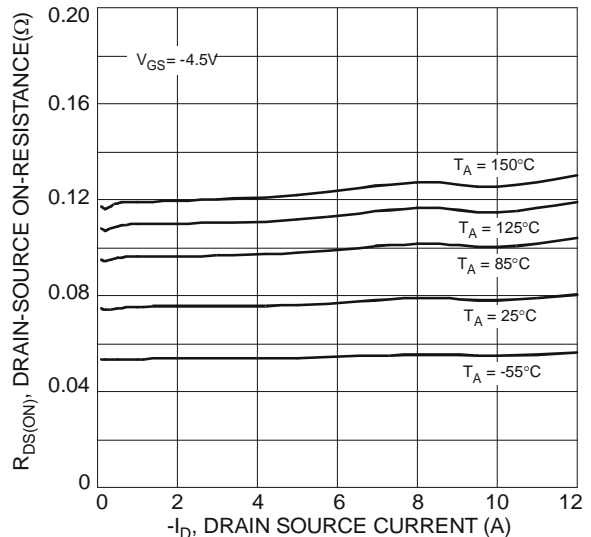


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

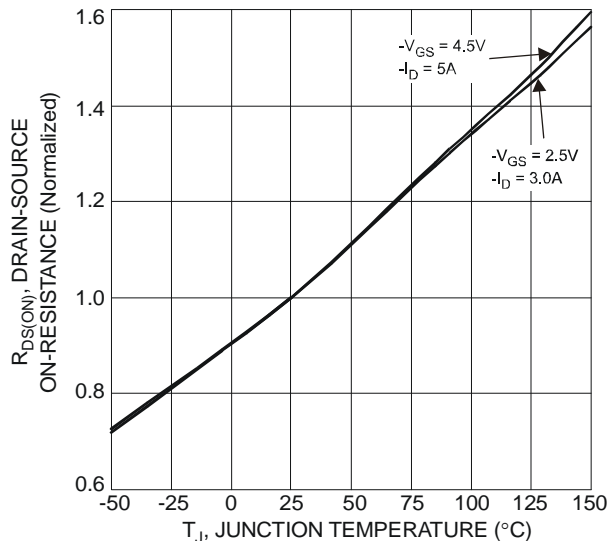


Fig. 5 On-Resistance Variation with Temperature

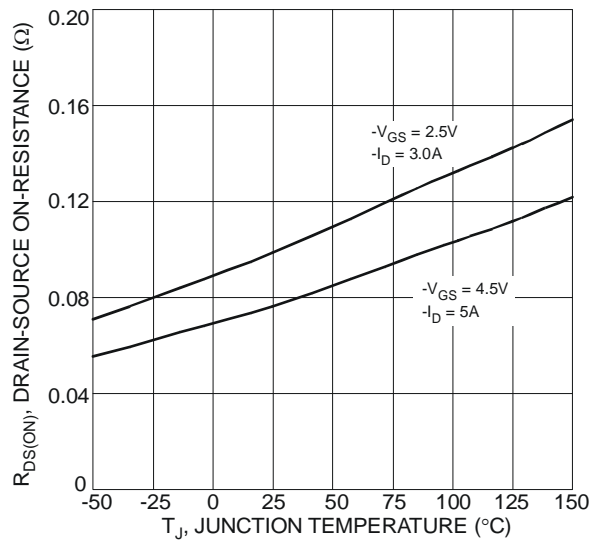


Fig. 6 On-Resistance Variation with Temperature

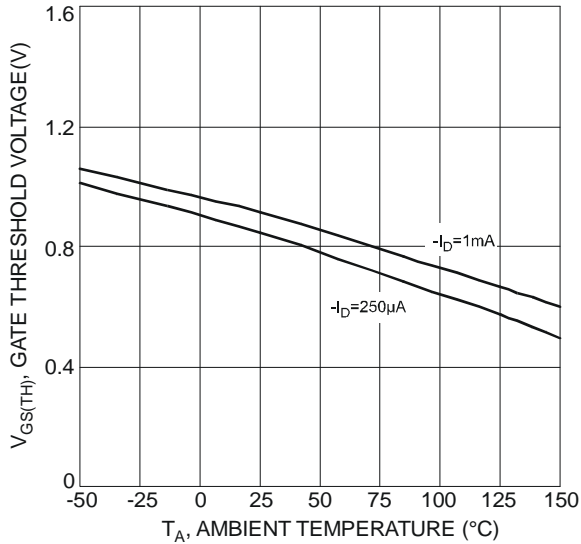


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

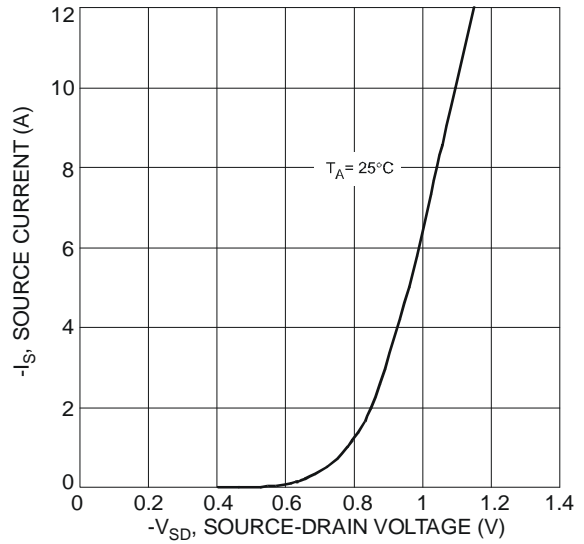


Fig. 8 Diode Forward Voltage vs. Current

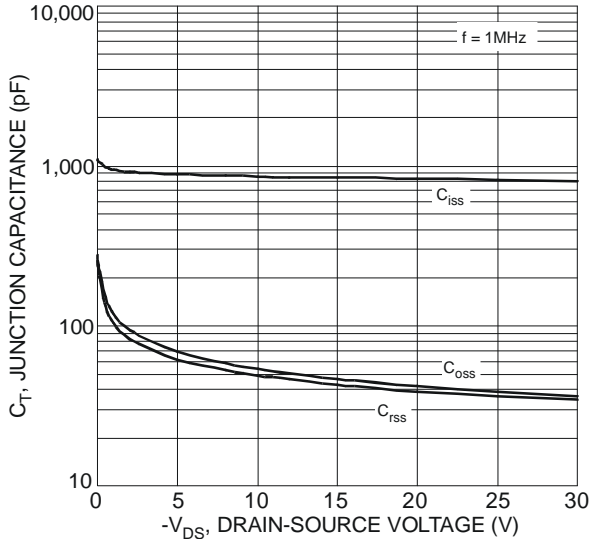


Fig. 9 Typical Junction Capacitance

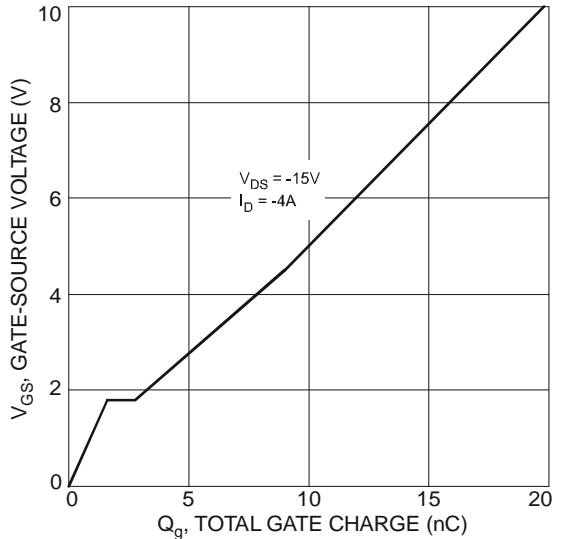


Fig. 10 Gate-Charge Characteristics

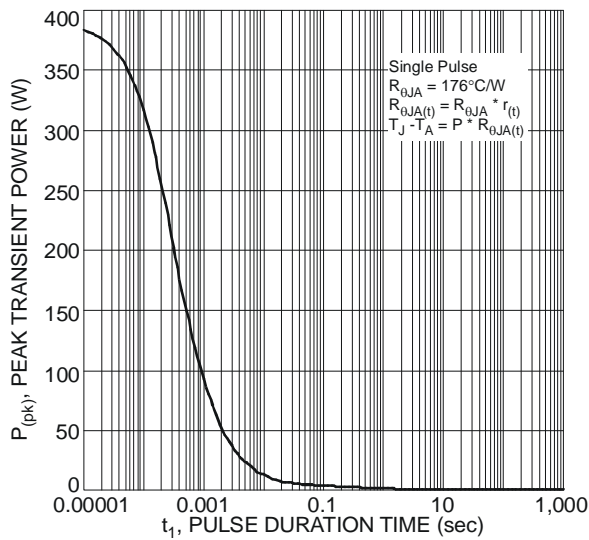


Fig. 11 Single Pulse Maximum Power Dissipation

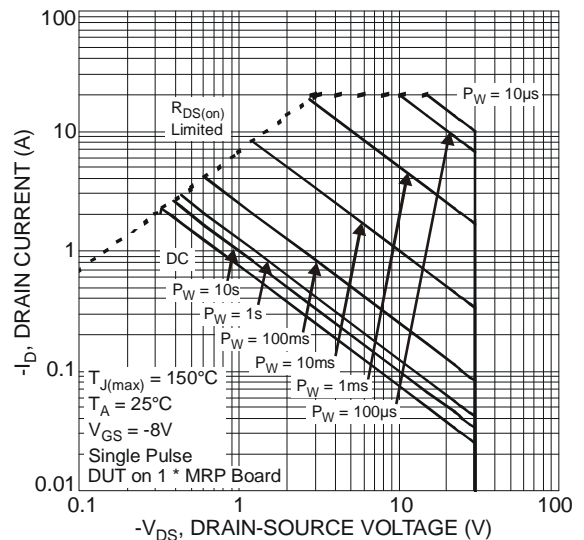


Fig. 12 SOA, Safe Operation Area

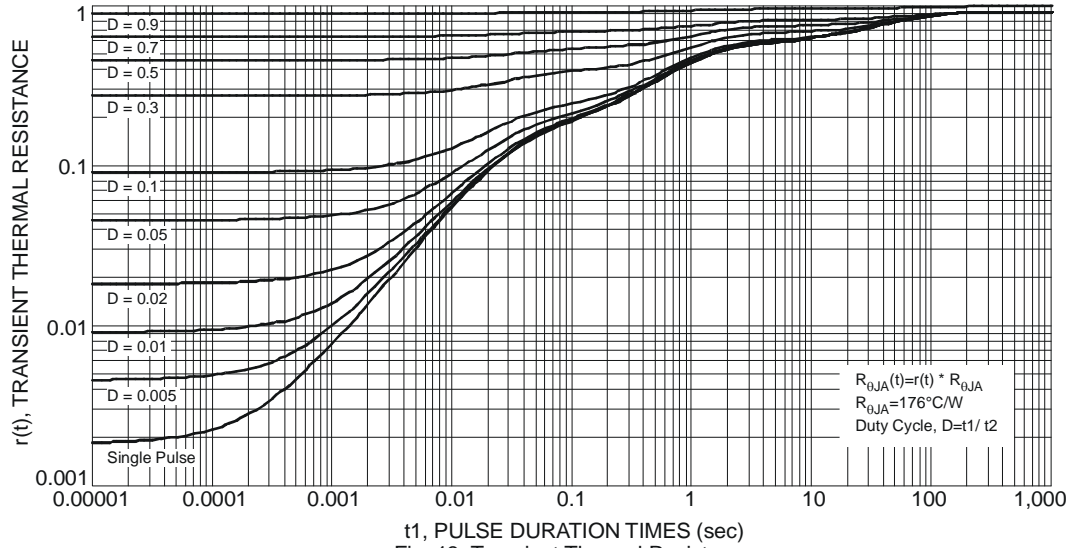
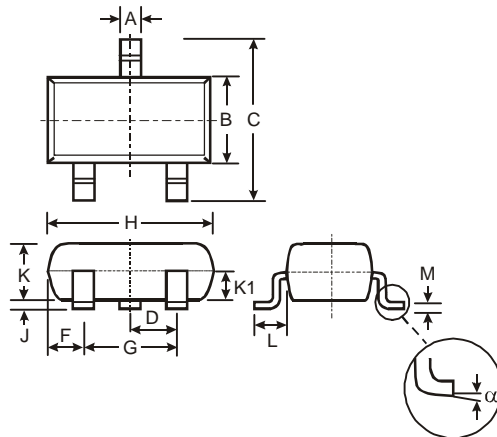


Fig. 13 Transient Thermal Resistance

**Package Outline Dimensions**

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

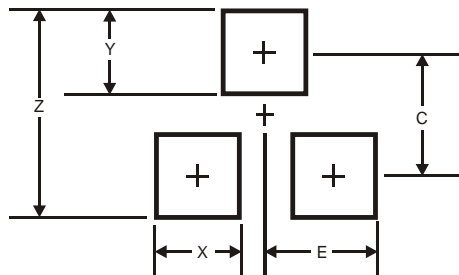


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	8°	-

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)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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