

## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$ Max	$I_D$ $T_A = +25^\circ\text{C}$
-12V	31m $\Omega$ @ $V_{GS} = -4.5\text{V}$	5.2A
	45m $\Omega$ @ $V_{GS} = -2.5\text{V}$	4.3A

## Description

This new generation MOSFET is designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) while maintaining superior switching performance, which makes the device 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
- **ESD Protected**
- **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**
- **An Automotive-Compliant Part is Available Under Separate Data Sheet ([DMP1045UQ](#))**

## Mechanical Data

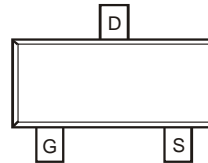
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish—Matte Tin Annealed Over Copper Leadframe. Solderable per MIL-STD-202, Method 208  $\text{G3}$
- Weight: 0.009 grams (Approximate)



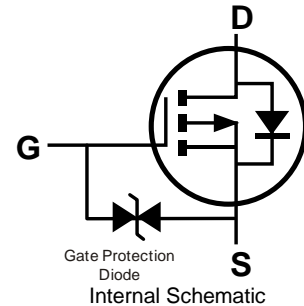
SOT23



Top View



Pin Configuration

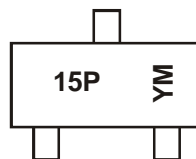

 Internal Schematic  
Gate Protection Diode

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP1045U-7	SOT23	3,000/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, see <http://www.diodes.com/products/packages.html>.

## Marking Information



15P = Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: E = 2017)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2010	~	2016	2017	2018	2019	2020	2021	2022	2023
Code	X	~	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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	-12	V
Gate-Source Voltage			V <sub>GSS</sub>	±8	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	4.0	A
		T <sub>A</sub> = +70°C		3.1	
Continuous Drain Current (Note 5) V <sub>GS</sub> = -2.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	3.3	A
		T <sub>A</sub> = +70°C		2.6	
Continuous Drain Current (Note 6) V <sub>GS</sub> = -4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	5.2	A
		T <sub>A</sub> = +70°C		4.2	
Continuous Drain Current (Note 6) V <sub>GS</sub> = -2.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	4.3	A
		T <sub>A</sub> = +70°C		3.4	
Maximum Continuous Body Diode Forward Current (Note 6)			I <sub>S</sub>	2	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) (Note 5)			I <sub>DM</sub>	40	A

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	0.8	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	168	°C/W
Total Power Dissipation (Note 6)	P <sub>D</sub>	1.3	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	99	°C/W
Thermal Resistance, Junction to Case (Note 6)	R <sub>θJC</sub>	14.8	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 7)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-12	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250µA
Zero Gate Voltage Drain Current (T <sub>J</sub> = +25°C)	I <sub>DSS</sub>	—	—	-1.0	µA	V <sub>DS</sub> = -12V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±10	µA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 7)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-0.3	-0.55	-1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	26	31	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4.0A
			31	45		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -3.5A
			45	75		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -2.7A
Forward Transfer Admittance	Y <sub>FS</sub>	—	12	—	S	V <sub>DS</sub> = -5V, I <sub>D</sub> = -4A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.6	—	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS</b> (Note 8)						
Input Capacitance	C <sub>ISS</sub>	—	1357	—	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>OSS</sub>	—	504	—	pF	
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	235	—	pF	
Gate Resistnace	R <sub>G</sub>	—	14.1	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
<b>SWITCHING CHARACTERISTICS</b> (Note 8)						
Total Gate Charge	Q <sub>G</sub>	—	15.8	—	nC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -4A
Gate-Source Charge	Q <sub>GS</sub>	—	2.0	—	nC	
Gate-Drain Charge	Q <sub>GD</sub>	—	3.9	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	15.7	—	ns	V <sub>DS</sub> = -10V, V <sub>GS</sub> = -4.5V, R <sub>L</sub> = 2.5Ω, R <sub>G</sub> = 3.0Ω
Turn-On Rise Time	t <sub>R</sub>	—	23.3	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	91.2	—	ns	
Turn-Off Fall Time	t <sub>F</sub>	—	106.9	—	ns	

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

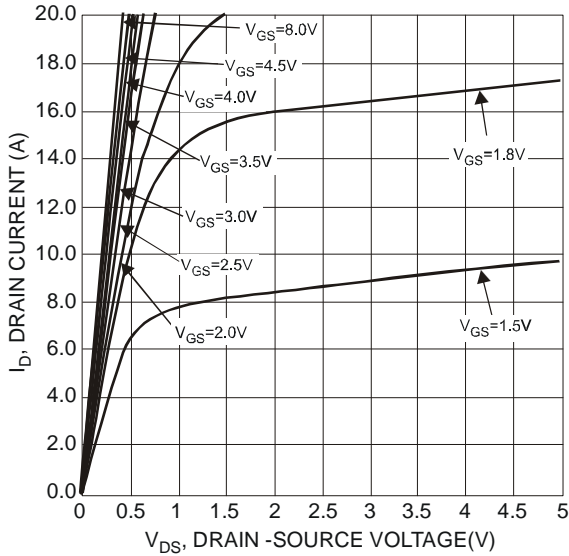


Fig. 1 Typical Output Characteristics

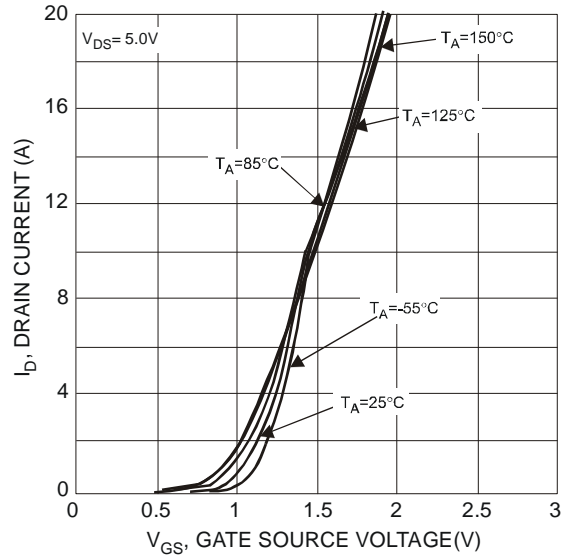


Fig. 2 Typical Transfer Characteristics

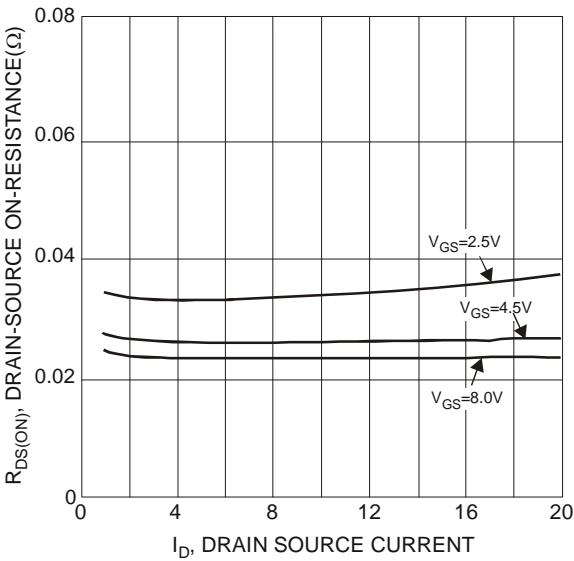


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

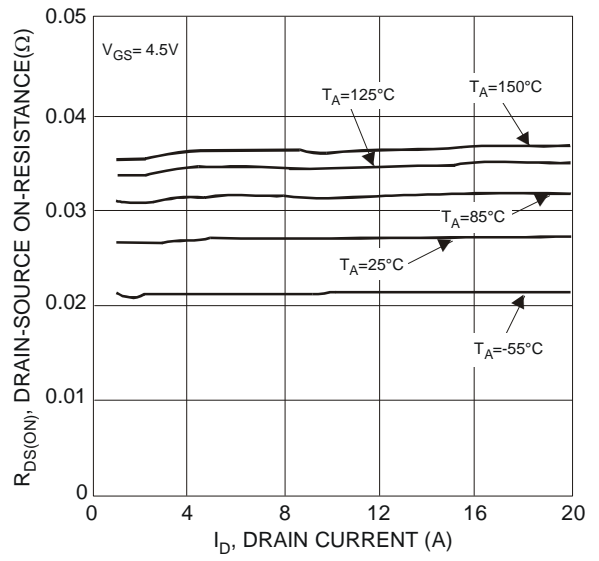


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

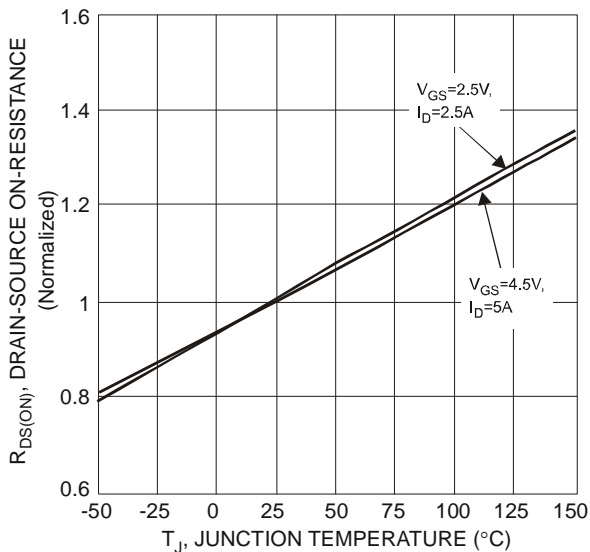


Fig. 5 On-Resistance Variation with Temperature

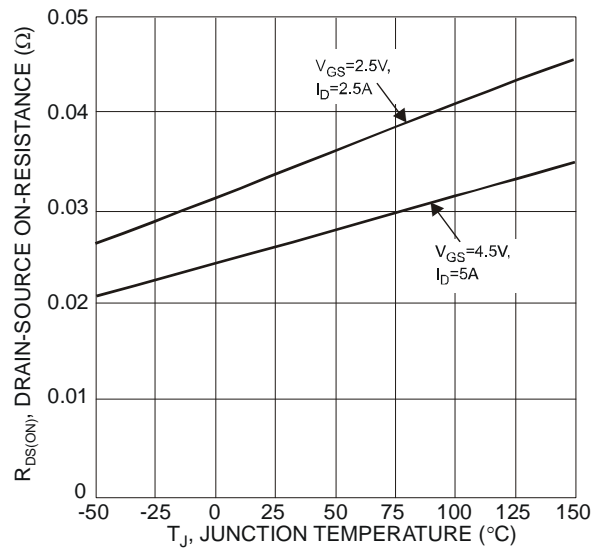


Fig. 6 On-Resistance Variation with Temperature

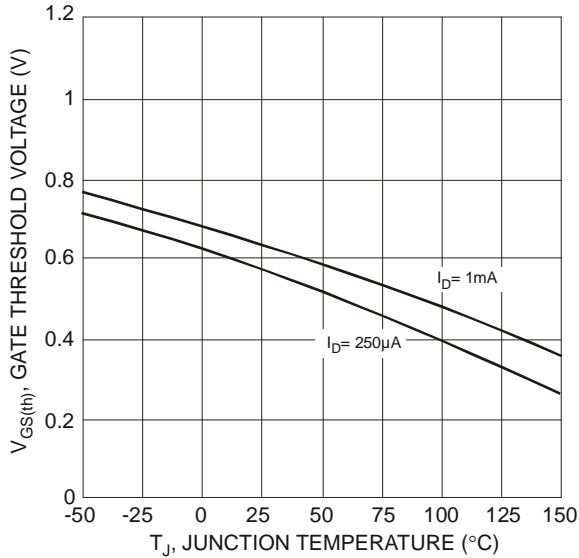


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

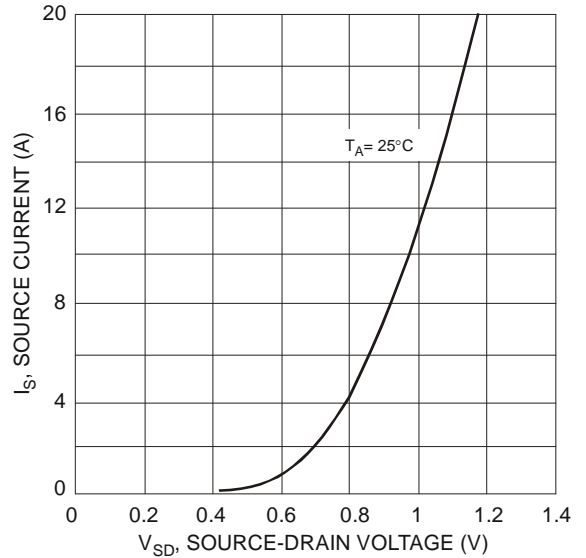


Fig. 8 Diode Forward Voltage vs. Current

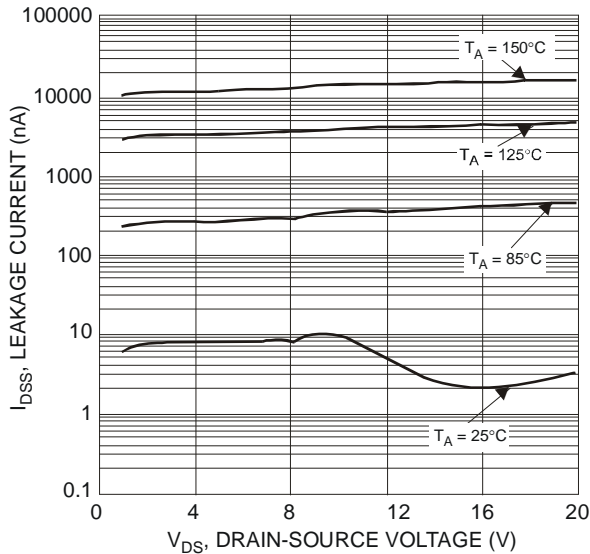


Fig. 9 Typical Drain-Source Leakage Current vs. Voltage

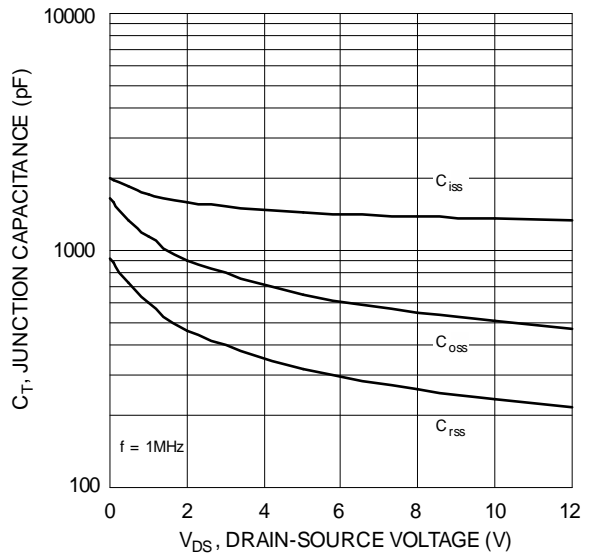


Fig. 10 Typical Junction Capacitance

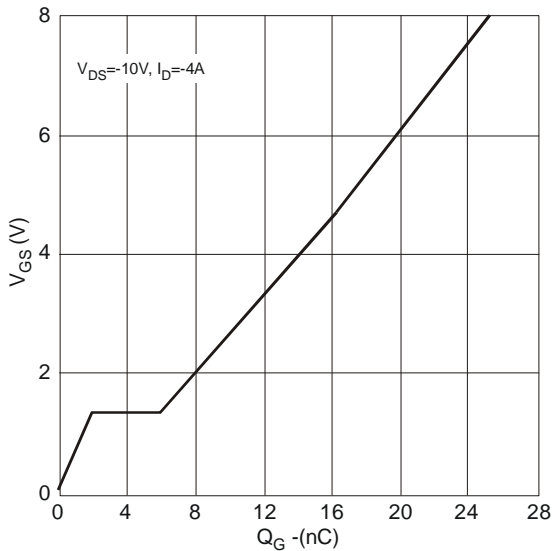


Fig. 11 Gate Charge Characteristics

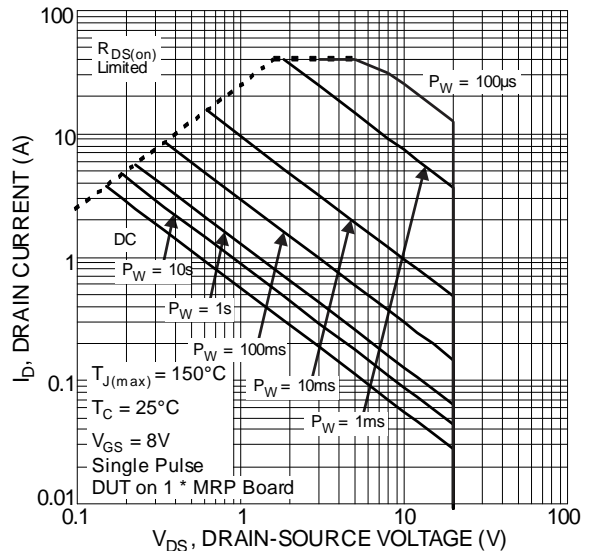
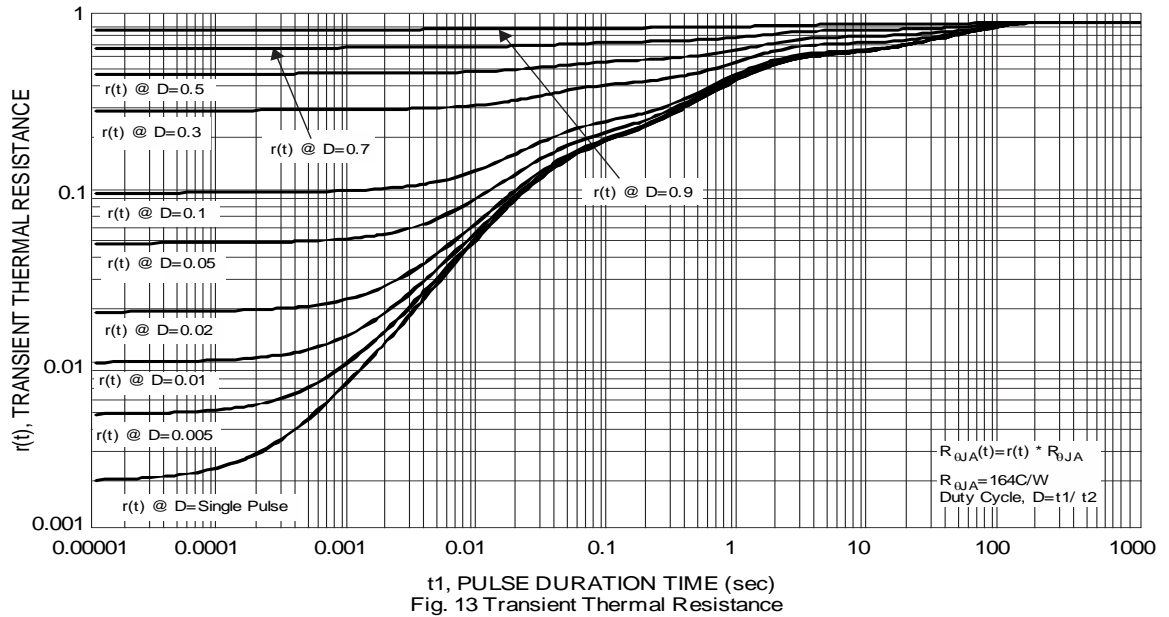


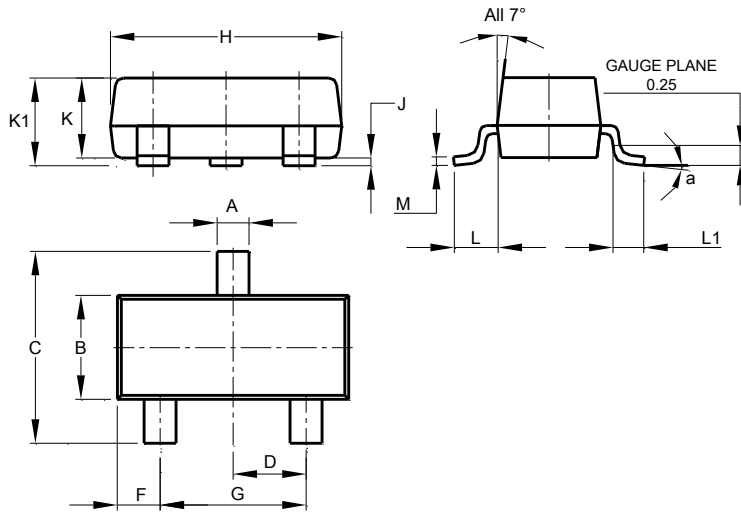
Figure 12 SOA, Safe Operation Area



**Package Outline Dimensions**

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

**SOT23**

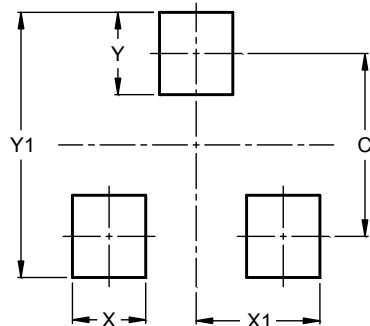


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

**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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