

# MSKSEMI

SEMICONDUCTOR



ESD



TVS



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PLED

Product data sheet

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## Mechanical Characteristics

- ◆ Package: SOD-323
- ◆ Lead Finish: Matte Tin
- ◆ Case Material: "Green" Molding Compound.
- ◆ UL Flammability Classification Rating 94V-0
- ◆ Moisture Sensitivity: Level 3 per J-STD-020
- ◆ Terminal Connections: See Diagram Below
- ◆ Marking Information: See Below

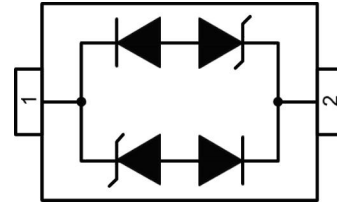
## Applications

- ◆ USB Ports
- ◆ Smart Phones
- ◆ Wireless Systems
- ◆ Ethernet 10/100/1000 Base T

## Features

- ◆ 350W peak pulse power (8/20 $\mu$ s)
- ◆ Ultra low capacitance : 1.0pF typical
- ◆ Ultra low leakage: nA level
- ◆ Low Operating: 3.3V,5V,8V,12V,15V,24V
- ◆ Low clamping voltage
- ◆ Protects one power line or data line
- ◆ Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test
    - Air discharge:  $\pm 30$ kV
    - Contact discharge:  $\pm 30$ kV
  - IEC61000-4-4 (EFT) 40A (5/50ns)
- ◆ RoHS Compliant

## Dimensions and Pin Configuration



Circuit and Pin Schematic

SOD-323

## Absolute Maximum Ratings ( $T_A=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
ESD per IEC 61000-4-2 (Air)	V <sub>ESD</sub>	$\pm 30$	kV
ESD per IEC 61000-4-2 (Contact)		$\pm 30$	
Operating Temperature Range	T <sub>J</sub>	-40 to +85	$^{\circ}\text{C}$
Storage Temperature Range	T <sub>stg</sub>	-55 to +150	$^{\circ}\text{C}$

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

SPD9103W-MS						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			3.3	V	
Breakdown Voltage	VBR	4			V	$I_T = 1\text{mA}$
Reverse Leakage Current	$I_R$		1	100	nA	$V_{RWM} = 3.3\text{V}$
Clamping Voltage	$V_C$			7	V	$I_{PP} = 1\text{A}$ (8 x 20 $\mu\text{s}$ pulse)
Clamping Voltage	$V_C$			16	V	$I_{PP} = 20\text{A}$ (8 x 20 $\mu\text{s}$ pulse)
Peak Pulse Current	$I_{PP}$			20	A	$t_p=8/20\mu\text{s}$
Junction Capacitance	$C_J$		1		pF	$V_R = 0\text{V}$ , $f = 1\text{MHz}$

SPD9105W-MS						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			5	V	
Breakdown Voltage	VBR	6			V	$I_T = 1\text{mA}$
Reverse Leakage Current	$I_R$		1	100	nA	$V_{RWM} = 5\text{V}$
Clamping Voltage	$V_C$			10	V	$I_{PP} = 1\text{A}$ (8 x 20 $\mu\text{s}$ pulse)
Clamping Voltage	$V_C$			18	V	$I_{PP} = 18\text{A}$ (8 x 20 $\mu\text{s}$ pulse)
Peak Pulse Current	$I_{PP}$			18	A	$t_p=8/20\mu\text{s}$
Junction Capacitance	$C_J$		1		pF	$V_R = 0\text{V}$ , $f = 1\text{MHz}$

SPD9108W-MS						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			8	V	
Breakdown Voltage	VBR	8.5			V	IT = 1mA
Reverse Leakage Current	IR		1	100	nA	VRWM = 8V
Clamping Voltage	VC			14	V	I <sub>PP</sub> = 1A (8 x 20μs pulse)
Clamping Voltage	VC			19	V	I <sub>PP</sub> = 13A (8 x 20μs pulse)
Peak Pulse Current	I <sub>PP</sub>			13	A	tp=8/20μs
Junction Capacitance	CJ		1		pF	VR = 0V, f = 1MHz

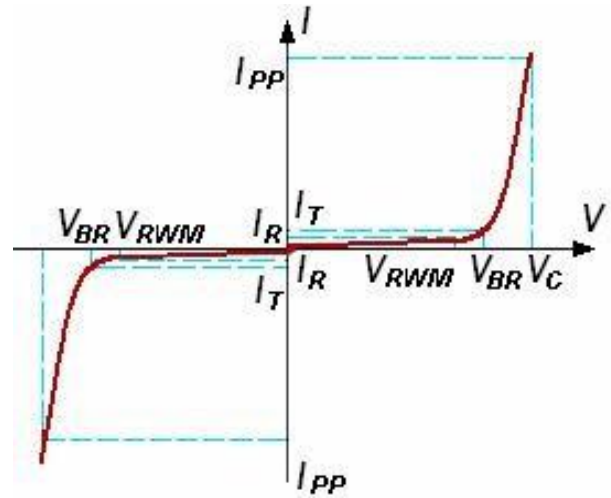
SPD9112W-MS						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			12	V	
Breakdown Voltage	VBR	13.3			V	IT = 1mA
Reverse Leakage Current	IR		1	100	nA	VRWM = 12V
Clamping Voltage	VC			19	V	I <sub>PP</sub> = 1A (8 x 20μs pulse)
Clamping Voltage	VC			25	V	I <sub>PP</sub> = 10A (8 x 20μs pulse)
Peak Pulse Current	I <sub>PP</sub>			10	A	tp=8/20μs
Junction Capacitance	CJ		1		pF	VR = 0V, f = 1MHz

SPD9115W-MS						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			15	V	
Breakdown Voltage	VBR	16.7			V	IT = 1mA
Reverse Leakage Current	IR		1	100	nA	VRWM = 15V
Clamping Voltage	VC			20	V	I <sub>PP</sub> = 1A (8 x 20μs pulse)
Clamping Voltage	VC			31	V	I <sub>PP</sub> = 8A (8 x 20μs pulse)
Peak Pulse Current	I <sub>PP</sub>			8	A	tp=8/20μs
Junction Capacitance	CJ		1		pF	VR = 0V, f = 1MHz

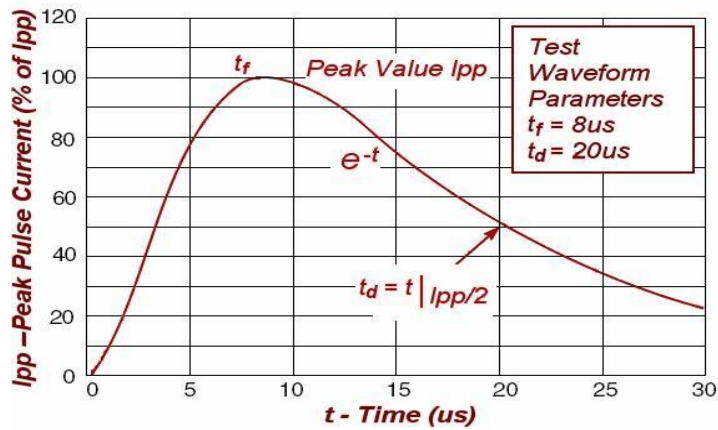
SPD9124W-MS						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			24	V	
Breakdown Voltage	VBR	26.7			V	IT = 1mA
Reverse Leakage Current	IR		1	100	nA	VRWM = 24V
Clamping Voltage	VC			40	V	I <sub>PP</sub> = 1A (8 x 20μs pulse)
Clamping Voltage	VC			71	V	I <sub>PP</sub> = 3.5A (8 x 20μs pulse)
Peak Pulse Current	I <sub>PP</sub>			3.5	A	tp=8/20μs
Junction Capacitance	CJ		1		pF	VR = 0V, f = 1MHz

**Electrical Parameter**

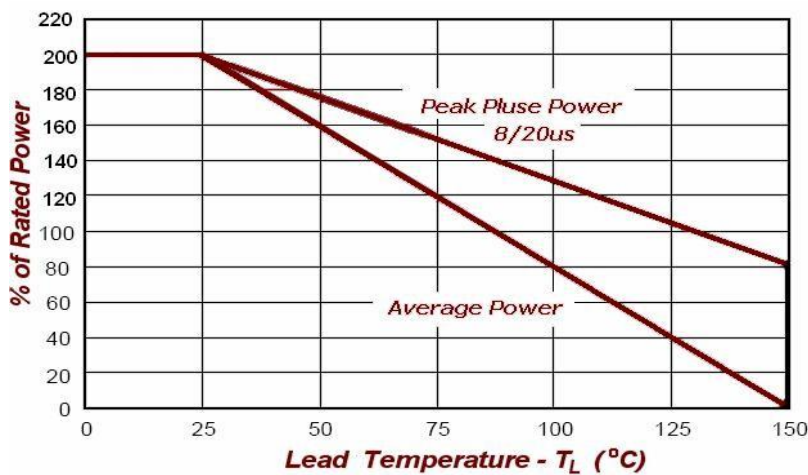
Symbol	Parameter
$I_{PP}$	Maximum Reverse Peak Pulse Current
$V_C$	Clamping Voltage @ $I_{PP}$
$V_{RWM}$	Working Peak Reverse Voltage
$I_R$	Maximum Reverse Leakage Current @ $V_{RWM}$
$I_T$	Test Current
$V_{BR}$	Breakdown Voltage @ $I_T$



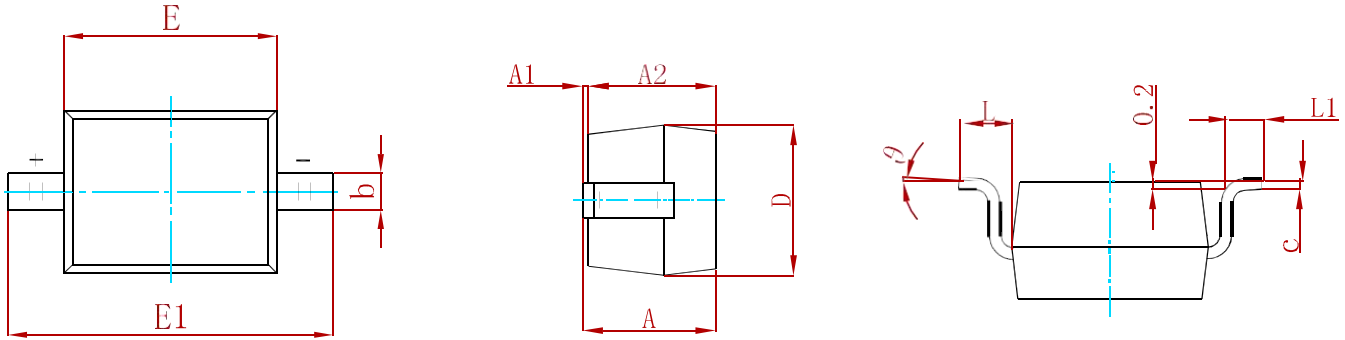
**FIG1: Pulse Waveform**



**FIG2: Power Derating**

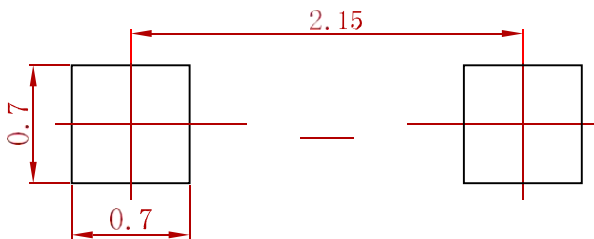


**PACKAGE MECHANICAL DATA**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A		1.000		0.039
A1	0.000	0.100	0.000	0.004
A2	0.800	0.900	0.031	0.035
b	0.250	0.350	0.010	0.014
c	0.080	0.150	0.003	0.006
D	1.200	1.400	0.047	0.055
E	1.600	1.800	0.063	0.071
E1	2.550	2.750	0.100	0.108
L	0.475 REF.		0.019 REF.	
L1	0.250	0.400	0.010	0.016
θ	0°	8°	0°	8°

**Suggested Pad Layout**



**Note:**

1. Controlling dimension: in millimeters.
2. General tolerance: ± 0.05mm.
3. The pad layout is for reference purposes only.

**REEL SPECIFICATION**

P/N	PKG	QTY
SPD91XXW-MS	SOD-323	3000

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