



# WS15D3HP

## Transient Voltage Suppressor

### Features

- 1400 Watts Peak Pulse Power per Line ( $t_p = 8/20\mu s$ )
- Protects one I/O or power line
- Low Clamping Voltage
- Working Voltage: 15V
- Low Leakage Current



### IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD)  $\pm 30kV$  (air),  $\pm 30kV$  (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 50A (8/20 $\mu s$ )

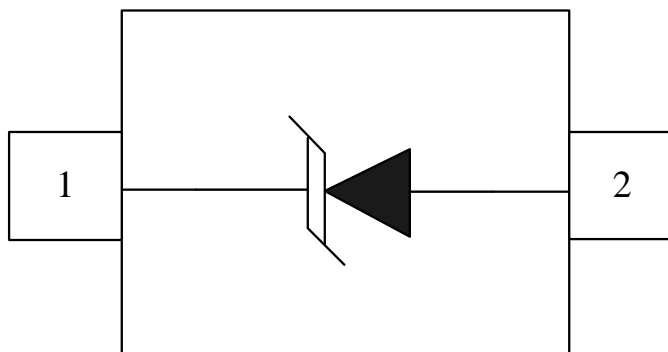
### Mechanical Characteristics

- SOD-323F package
- Marking: Marking Code
- Packaging : Tape and Reel per EIA 481
- RoHS Compliant

### Applications

- Laptop Computers
- Cellular Phones
- Digital Cameras
- Personal Digital Assistants (PDAs)

### Schematic & PIN Configuration

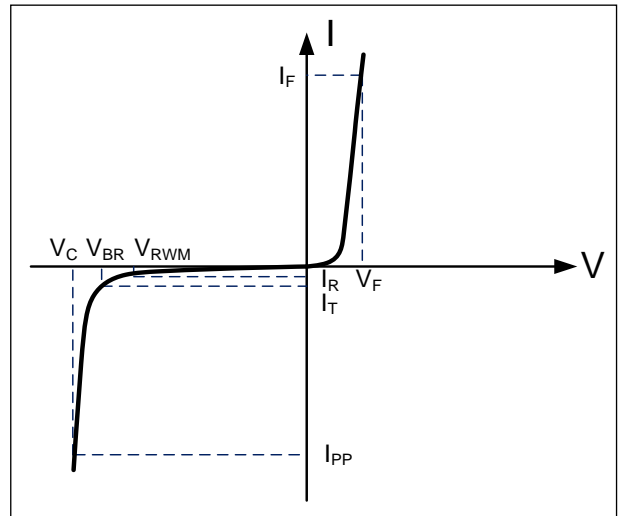


SOD-323F (Top View)

Absolute Maximum Rating			
Rating	Symbol	Value	Units
Peak Pulse Power ( $t_p = 8/20\mu s$ )	$P_{PP}$	1400	Watts
Peak Pulse Current ( $t_p = 8/20\mu s$ )	$I_{PP}$	50	A
Operating Temperature	$T_J$	-55 to +125	$^{\circ}C$
Storage Temperature	$T_{STG}$	-55 to +150	$^{\circ}C$

Electrical Parameters (T=25°C)

Symbol	Parameter
$I_{PP}$	Reverse Peak Pulse Current
$V_C$	Clamping Voltage @ $I_{PP}$
$V_{RWM}$	Reverse Stand-Off Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	Breakdown Voltage @ $I_T$
$I_T$	Test Current
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$



Electrical Characteristics

WS15D3HP						
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	$V_{RWM}$				15	V
Reverse Breakdown Voltage	$V_{BR}$	$I_T = 1mA$	16		20	V
Forward Voltage	$V_F$	$I_F = 10mA$	0.5		1.0	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 15V, T = 25^{\circ}C$			100	nA
Clamping Voltage	$V_C$	$I_{PP} = 50A, t_p = 8/20\mu s$		25	28	V
ESD Clamping Voltage <sup>1</sup>	$V_C$	$I_{PP} = 4A, t_p = 0.2/100ns$ (TLP)		17.4		V
ESD Clamping Voltage <sup>1</sup>	$V_C$	$I_{PP} = 16A, t_p = 0.2/100ns$ (TLP)		18.6		V
Dynamic Resistance <sup>1,2</sup>	$R_{DYN}$	TLP=0.2/100ns		0.1		$\Omega$
Junction Capacitance	$C_j$	$V_R = 0V, f = 1MHz$		320	350	pF

Notes : 1、 TLP Setting :  $t_p = 100ns, t_r = 0.2ns, I_{TLP}$  and  $V_{TLP}$  sample window:  $t_1 = 70ns$  to  $t_2 = 90ns$ .  
 2、 Dynamic resistance calculated from  $I_{PP} = 4A$  to  $I_{PP} = 16A$  using "Best Fit".

Typical Characteristics

Figure 1: Peak Pulse Power vs. Pulse Time

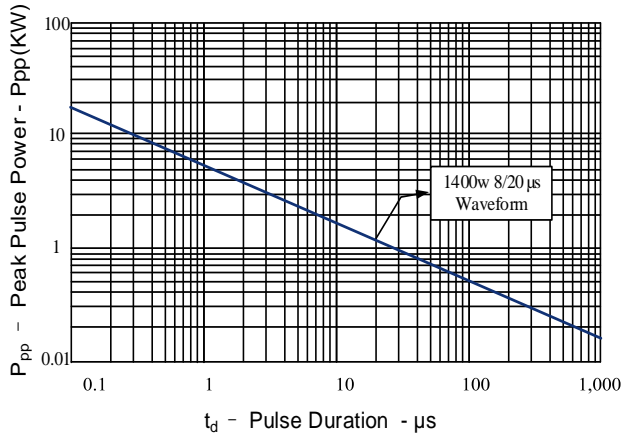


Figure 2: Power Derating Curve

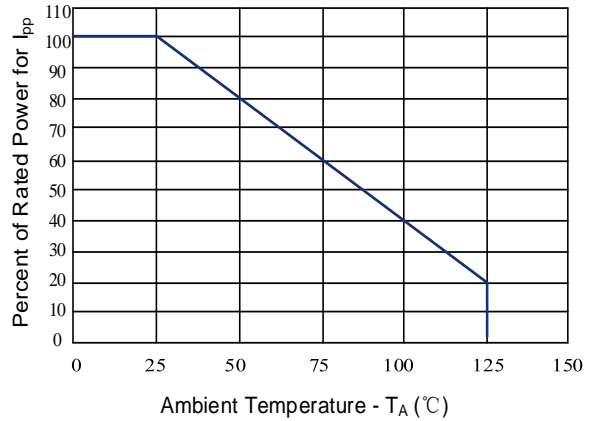


Figure 3: Clamping Voltage vs. Peak Pulse Current

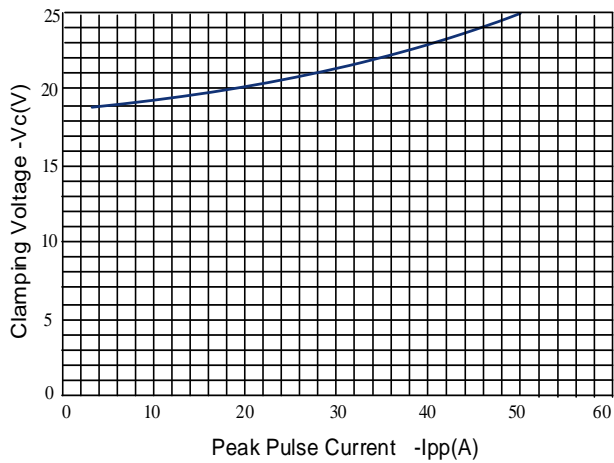


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

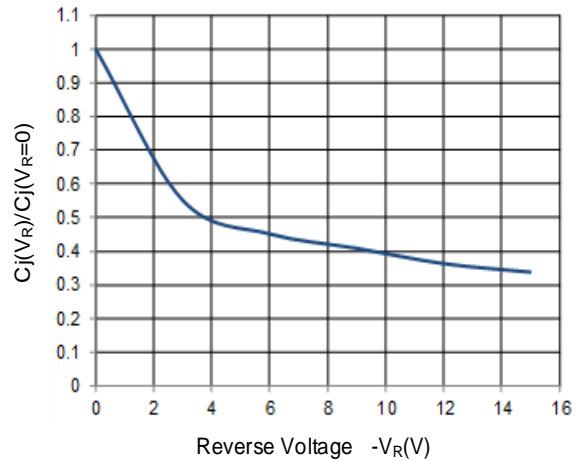


Figure 5: Pulse Waveform

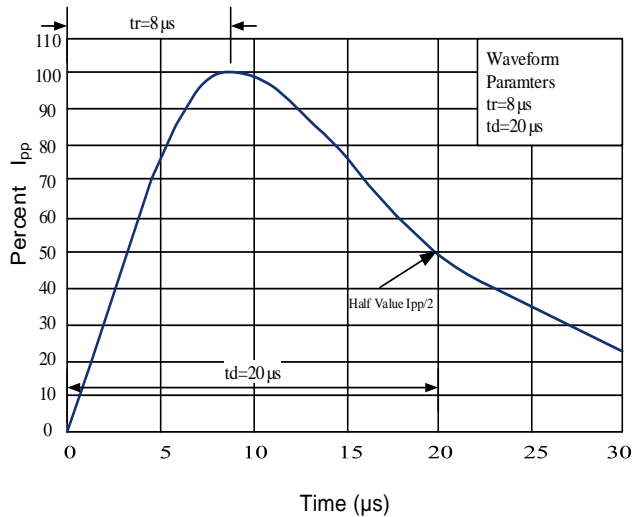
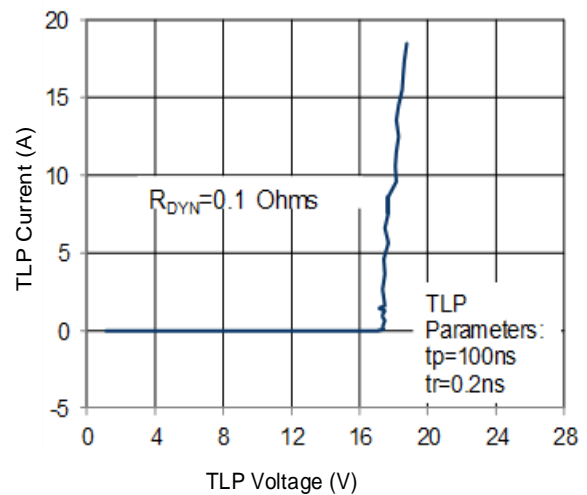
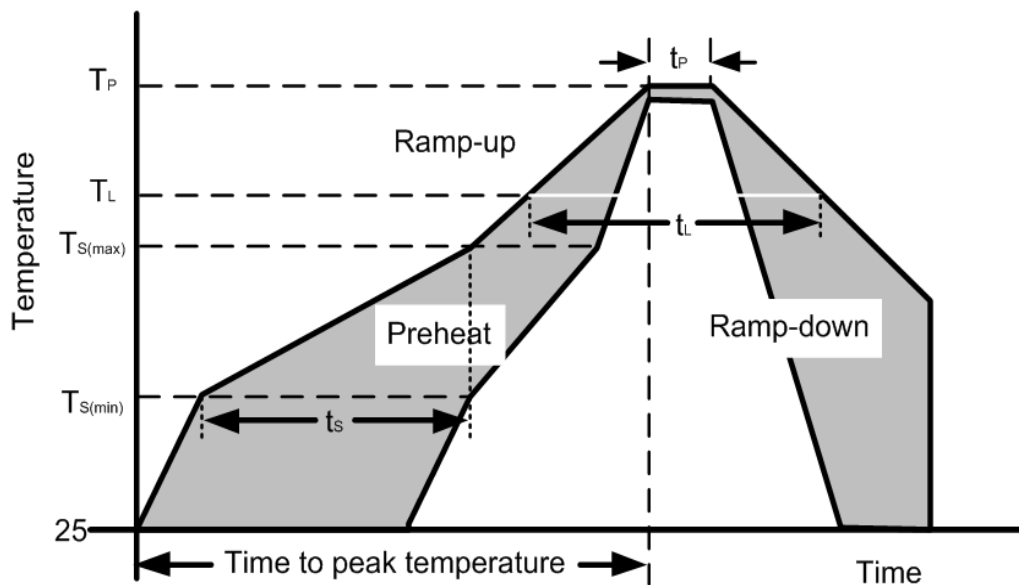


Figure 6: TLP Positive I-V Curve

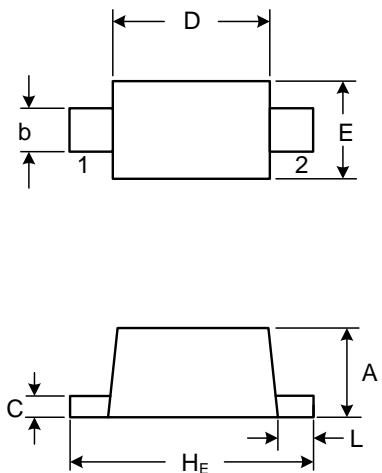
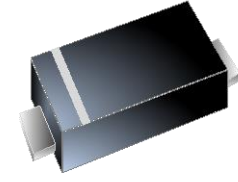
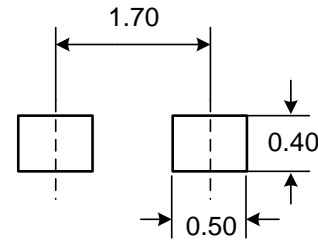


Soldering Parameters

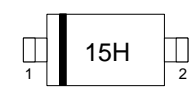
Reflow Condition		Pb – Free assembly
Pre Heat	Temperature Min ( $T_{S(min)}$ )	150°C
	Temperature Max ( $T_{S(max)}$ )	200°C
	Time (min to max) ( $t_s$ )	60 – 190 secs
Average ramp up rate (Liquidus Temp) ( $T_L$ ) to peak		5°C/second max
$T_{S(max)}$ to $T_L$ —Ramp-up Rate		5°C/second max
Reflow	Temperature ( $T_L$ ) (Liquidus)	217°C
	Temperature ( $t_L$ )	60 – 150 seconds
Peak Temperature ( $T_P$ )		260+0/-5 °C
Time within actual peak Temperature ( $t_p$ )		20 – 40 seconds
Ramp-down Rate		5°C/second max
Time 25°C to peak Temperature ( $T_P$ )		8 minutes Max.
Do not exceed		280°C



Outline Drawing – SOD-323F

<p><b>PACKAGE OUTLINE</b></p> 	 <p>SOD-323F</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">SYMBOL</th> <th colspan="3">MILLIMETERS</th> </tr> <tr> <th>MIN</th> <th>TYP</th> <th>MAX</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>0.60</td> <td>0.65</td> <td>0.75</td> </tr> <tr> <td>b</td> <td>0.25</td> <td>0.30</td> <td>0.40</td> </tr> <tr> <td>C</td> <td>0.06</td> <td>0.13</td> <td>0.21</td> </tr> <tr> <td>D</td> <td>1.60</td> <td>1.70</td> <td>1.80</td> </tr> <tr> <td>E</td> <td>1.15</td> <td>1.25</td> <td>1.35</td> </tr> <tr> <td>H<sub>E</sub></td> <td>2.30</td> <td>2.50</td> <td>2.70</td> </tr> <tr> <td>L</td> <td>0.30</td> <td>0.40</td> <td>0.50</td> </tr> </tbody> </table>	SYMBOL	MILLIMETERS			MIN	TYP	MAX	A	0.60	0.65	0.75	b	0.25	0.30	0.40	C	0.06	0.13	0.21	D	1.60	1.70	1.80	E	1.15	1.25	1.35	H <sub>E</sub>	2.30	2.50	2.70	L	0.30	0.40	0.50
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 <p style="text-align: center;">DIMENSIONS: MILLIMETERS</p>	<p><b>Notes:</b> Controlling Dimension: Millimeter.</p>																																			

**Marking Codes**

Part Number	Marking Code
WS15D3HP	

**Package Information**

Qty: 3k/Reel

**CONTACT INFORMATION**

No.1001, Shiwan(7) Road, Pudong District, Shanghai, P.R.China.201207

Tel: 86-21-68969993 Fax: 86-21-50757680 Email: [market@way-on.com](mailto:market@way-on.com)

WAYON website: <http://www.way-on.com>

For additional information, please contact your local Sales Representative.

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Specifications are subject to change without notice.  
The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time.  
Users should verify actual device performance in their specific applications.