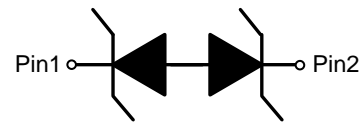


**ESD5491S**
**1-Line, Bi-directional, Transient Voltage Suppressors**
<http://www.sh-willsemi.com>
**Descriptions**

The ESD5491S is a bi-directional TVS (Transient Voltage Suppressor). It is specifically designed to protect sensitive electronic components which are connected to power lines, low speed data lines and control lines from over-stress caused by ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and Lightning.

The ESD5491S may be used to provide ESD protection up to  $\pm 30\text{kV}$  (contact discharge) according to IEC61000-4-2, and withstand peak pulse current up to 9A (8/20 $\mu\text{s}$ ) according to IEC61000-4-5.

The ESD5491S is available in SOD-523 package. Standard products are Pb-free and Halogen-free.


**SOD-523**

**Circuit diagram**
**Features**

- Stand-off voltage:  $\pm 3.3\text{V}$  Max
- Transient protection for each line according to IEC61000-4-2 (ESD):  $\pm 30\text{kV}$  (contact discharge)  
IEC61000-4-4 (EFT): 40A (5/50ns)  
IEC61000-4-5 (surge): 9A (8/20 $\mu\text{s}$ )
- Capacitance:  $C_J = 9.9\text{pF}$  typ.
- Low leakage current:  $I_R = 11\text{nA}$  typ.
- Low clamping voltage:  $V_{CL} = 9\text{V}$  typ. @  $I_{PP} = 16\text{A}$  (TLP)
- Solid-state silicon technology



1 = Device code

\* = Month code ( A~Z)

**Marking (Top View)**
**Applications**

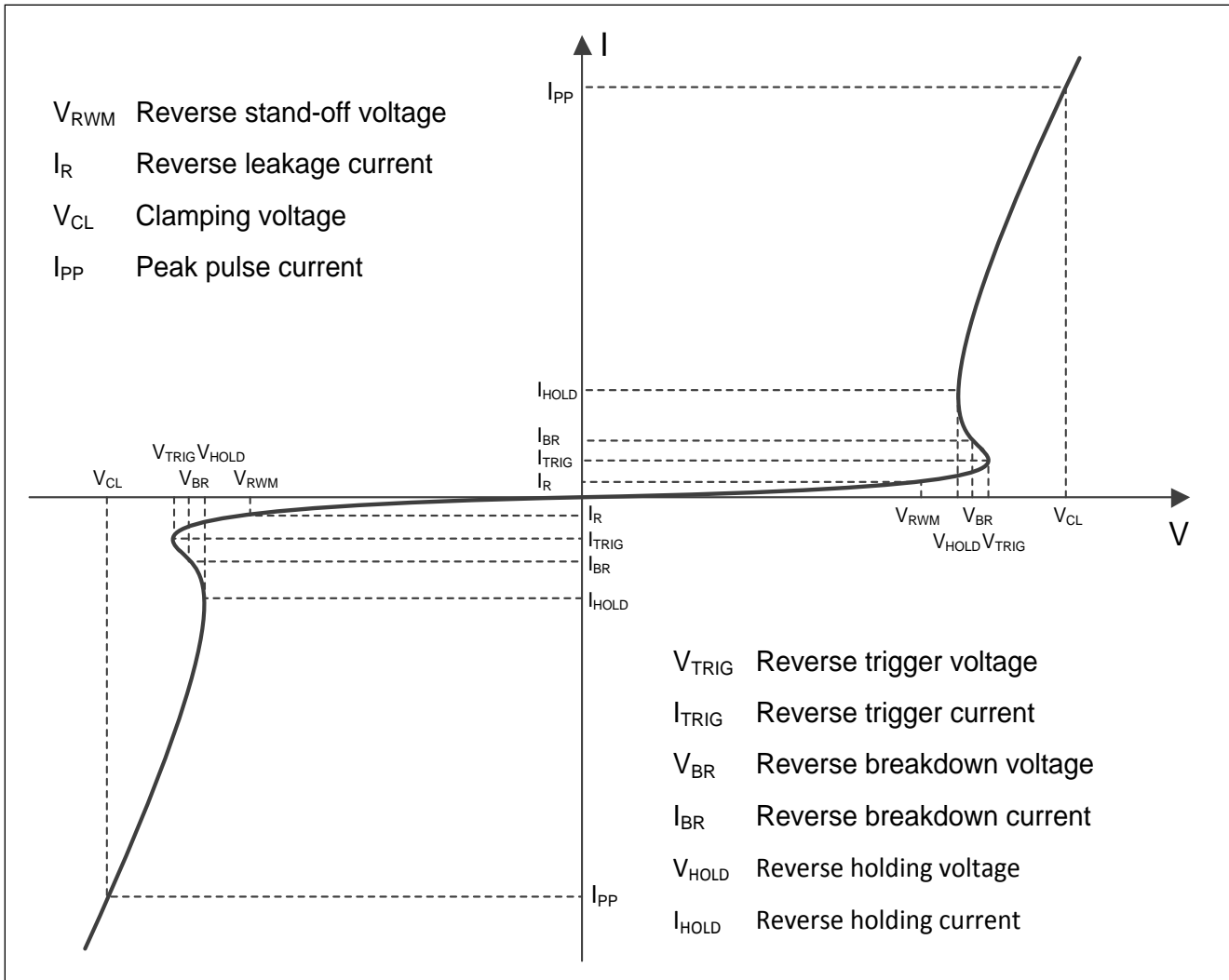
- Cellular handsets
- Computers and peripherals
- Microprocessors
- Power lines
- Portable Electronics
- Notebooks

**Order information**

Device	Package	Shipping
ESD5491S-2/TR	SOD-523	3000/Tape&Reel

**Absolute maximum ratings**

Parameter	Symbol	Rating	Unit
Peak pulse power ( $t_p = 8/20\mu s$ )	$P_{pk}$	90	W
Peak pulse current ( $t_p = 8/20\mu s$ )	$I_{pp}$	9	A
ESD according to IEC61000-4-2 air discharge	$V_{ESD}$	$\pm 30$	kV
ESD according to IEC61000-4-2 contact discharge		$\pm 30$	
Operation junction temperature	$T_J$	125	$^{\circ}C$
Lead temperature	$T_L$	260	$^{\circ}C$
Storage temperature	$T_{STG}$	-55~150	$^{\circ}C$

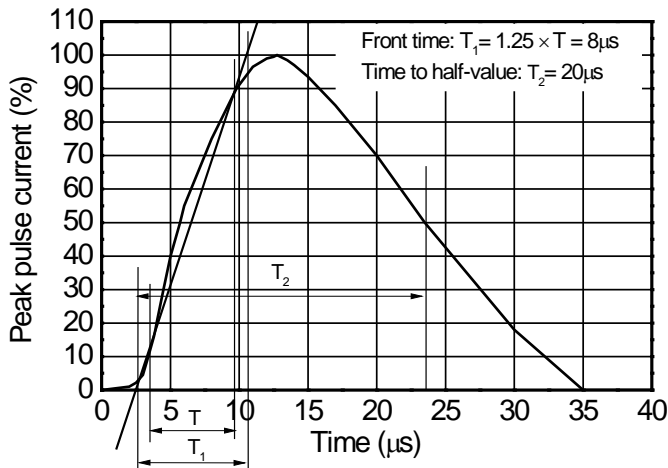
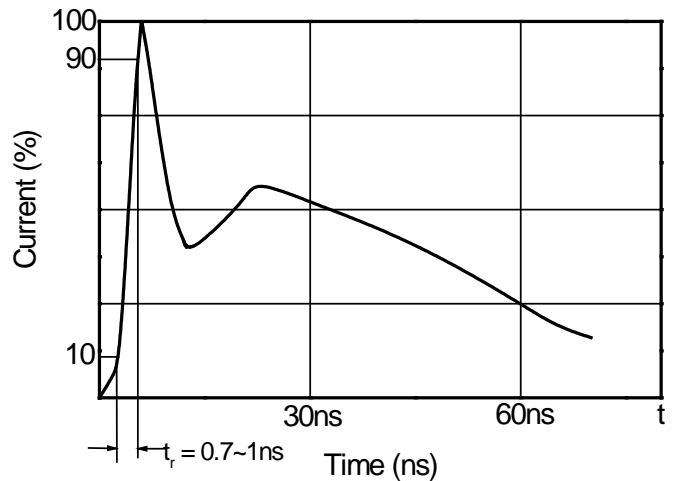
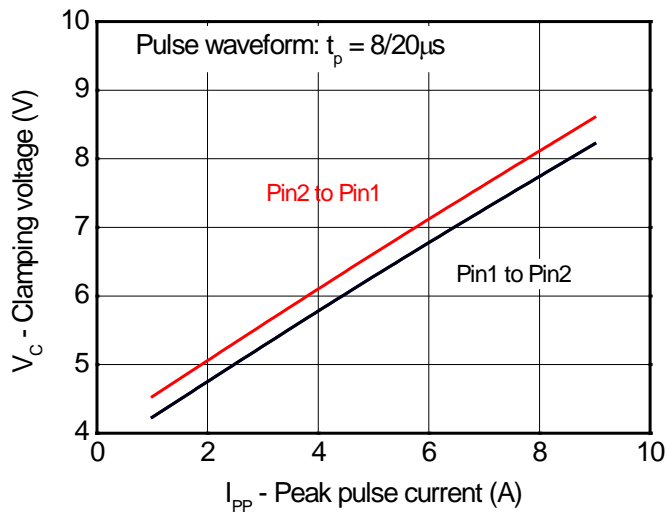
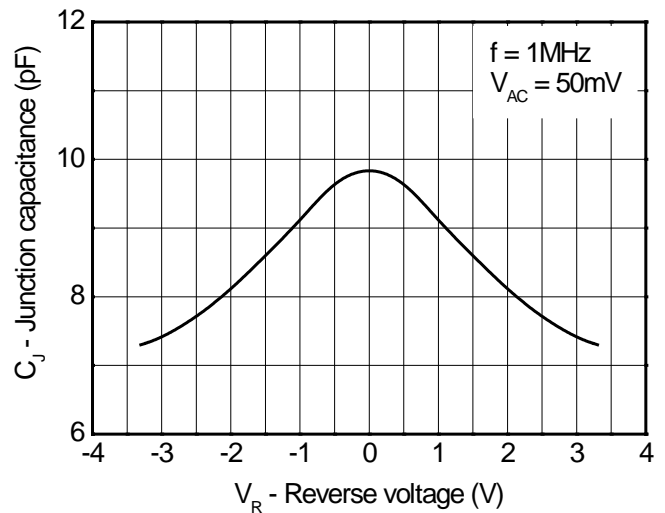
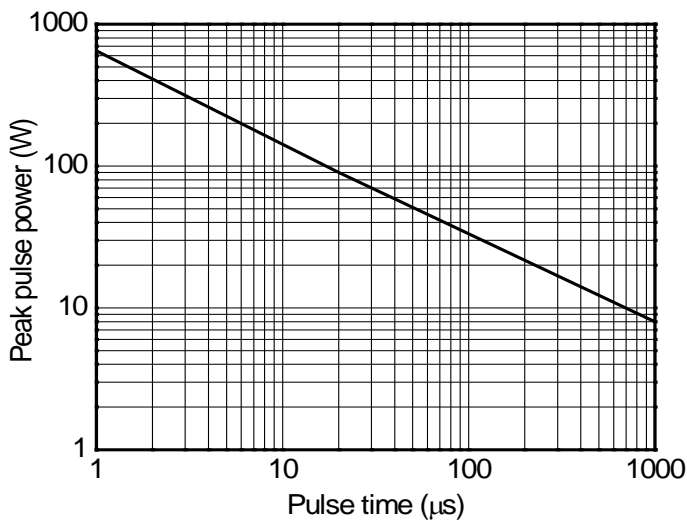
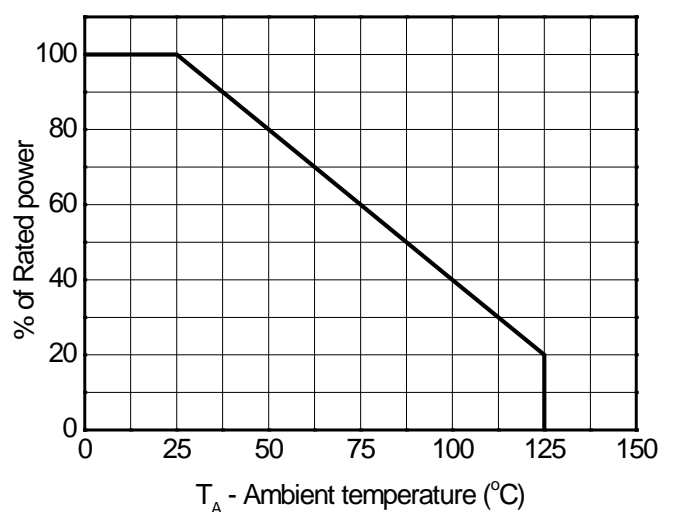
**Electrical characteristics ( $T_A=25^{\circ}C$ , unless otherwise noted)**

**Definitions of electrical characteristics**

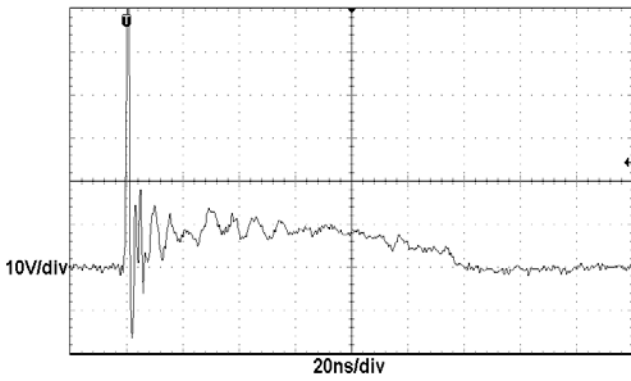
**Electrical characteristics (T<sub>A</sub>=25 °C, unless otherwise noted)**

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	V <sub>RWM</sub>				±3.3	V
Reverse leakage current	I <sub>R</sub>	V <sub>RWM</sub> = 3.3V		11	100	nA
Reverse breakdown voltage	V <sub>BR</sub>	I <sub>BR</sub> = 1mA	3.3			V
Reverse holding voltage	V <sub>HOLD</sub>	I <sub>HOLD</sub> = 50mA	3.3			V
Clamping voltage <sup>1)</sup>	V <sub>CL</sub>	I <sub>PP</sub> = 16A, t <sub>p</sub> = 100ns		9		V
Clamping voltage <sup>2)</sup>	V <sub>CL</sub>	V <sub>ESD</sub> = 8kV		9		V
Clamping voltage <sup>3)</sup>	V <sub>CL</sub>	I <sub>PP</sub> = 1A, t <sub>p</sub> = 8/20μs			6	V
		I <sub>PP</sub> = 5A, t <sub>p</sub> = 8/20μs			8	V
		I <sub>PP</sub> = 9A, t <sub>p</sub> = 8/20μs			10	V
Dynamic resistance <sup>1)</sup>	R <sub>DYN</sub>			0.20		Ω
Junction capacitance	C <sub>J</sub>	V <sub>R</sub> = 0V, f = 1MHz		9.9	12	pF
		V <sub>R</sub> = 3.3V, f = 1MHz		7.4	9	pF

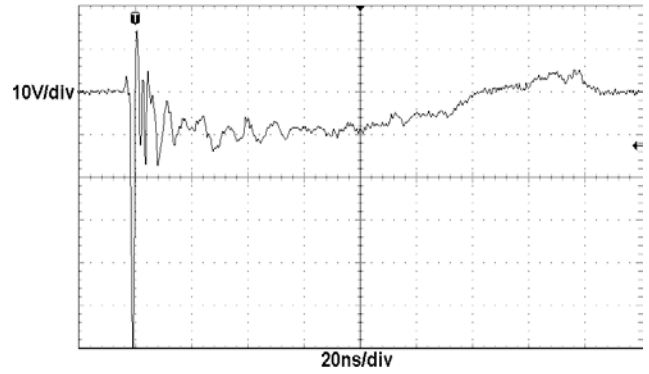
**Notes:**

- 1) TLP parameter: Z<sub>0</sub> = 50Ω, t<sub>p</sub> = 100ns, t<sub>r</sub> = 2ns, averaging window from 60ns to 80ns. R<sub>DYN</sub> is calculated from 4A to 16A.
- 2) Contact discharge mode, according to IEC61000-4-2.
- 3) Non-repetitive current pulse, according to IEC61000-4-5.

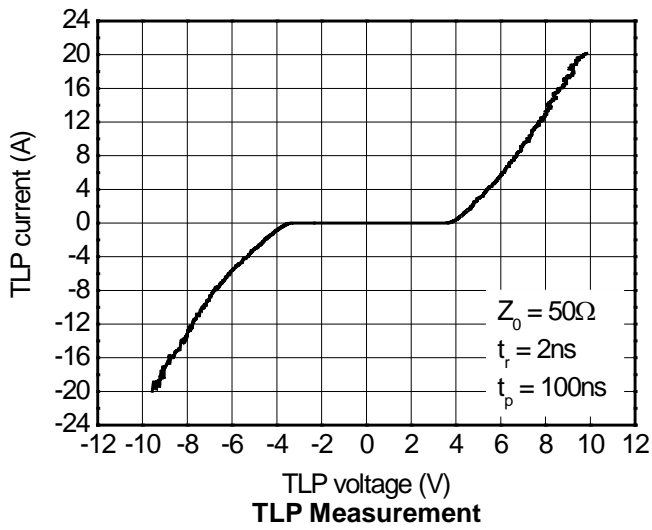
**Typical characteristics ( $T_A=25^\circ\text{C}$ , unless otherwise noted)**

**8/20 $\mu\text{s}$  waveform per IEC61000-4-5**

**Contact discharge current waveform per IEC61000-4-2**

**Clamping voltage vs. Peak pulse current**

**Capacitance vs. Reverse voltage**

**Non-repetitive peak pulse power vs. Pulse time**

**Power derating vs. Ambient temperature**

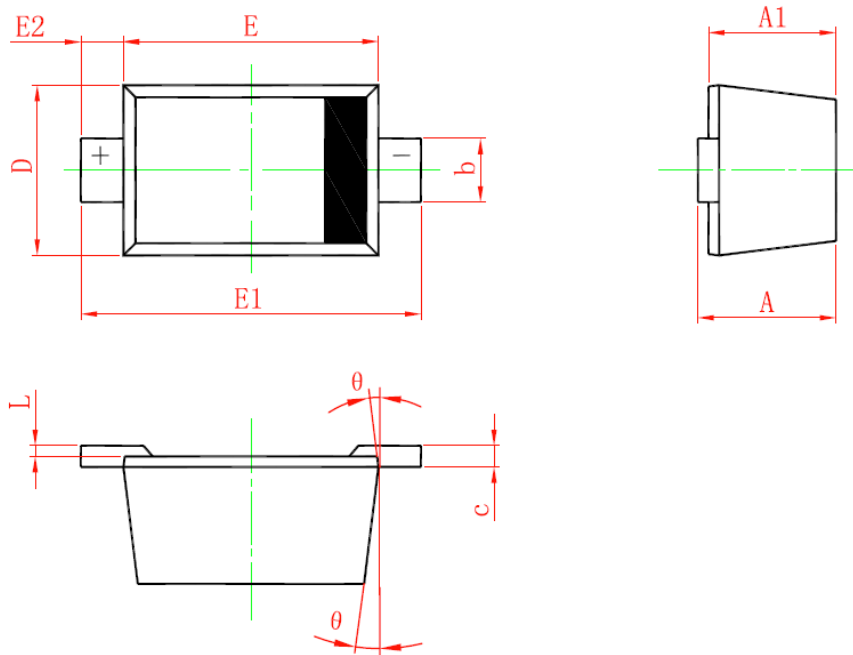


**ESD clamping**  
 (+8kV contact discharge per IEC61000-4-2)

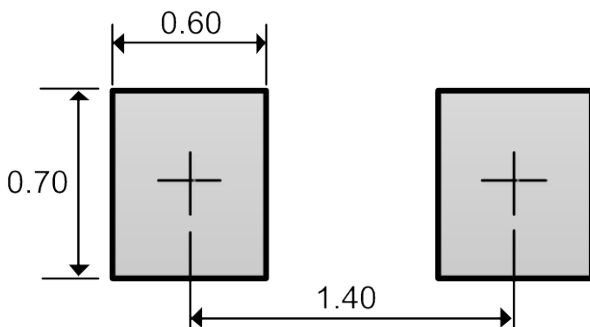


**ESD clamping**  
 (-8kV contact discharge per IEC61000-4-2)



**Package outline dimensions**
**SOD-523**


Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	0.510	0.640	0.770
A1	0.500	0.600	0.700
b	0.250	0.300	0.350
c	0.080	0.115	0.150
D	0.750	0.800	0.850
E	1.100	1.200	1.300
E1	1.500	1.600	1.700
E2	0.200 Ref		
L	0.010	0.040	0.070
θ	7° Ref		

**Recommend land pattern (Unit: mm)**


*Note: This land pattern is for your reference only. Actual pad layouts may vary depending on application.*