

ESD5491S

1-Line, Bi-directional, Transient Voltage Suppressors

<http://www.sh-willsemi.com>

Descriptions

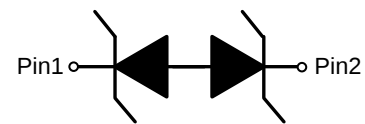
The ESD5491S is a bi-directional TVS (Transient Voltage Suppressor). It is specifically designed to protect sensitive electronic components which are connected to power lines, low speed data lines and control lines from over-stress caused by ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) 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 μs) according to IEC61000-4-5.

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



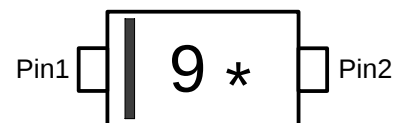
SOD-523



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 μs)
- 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

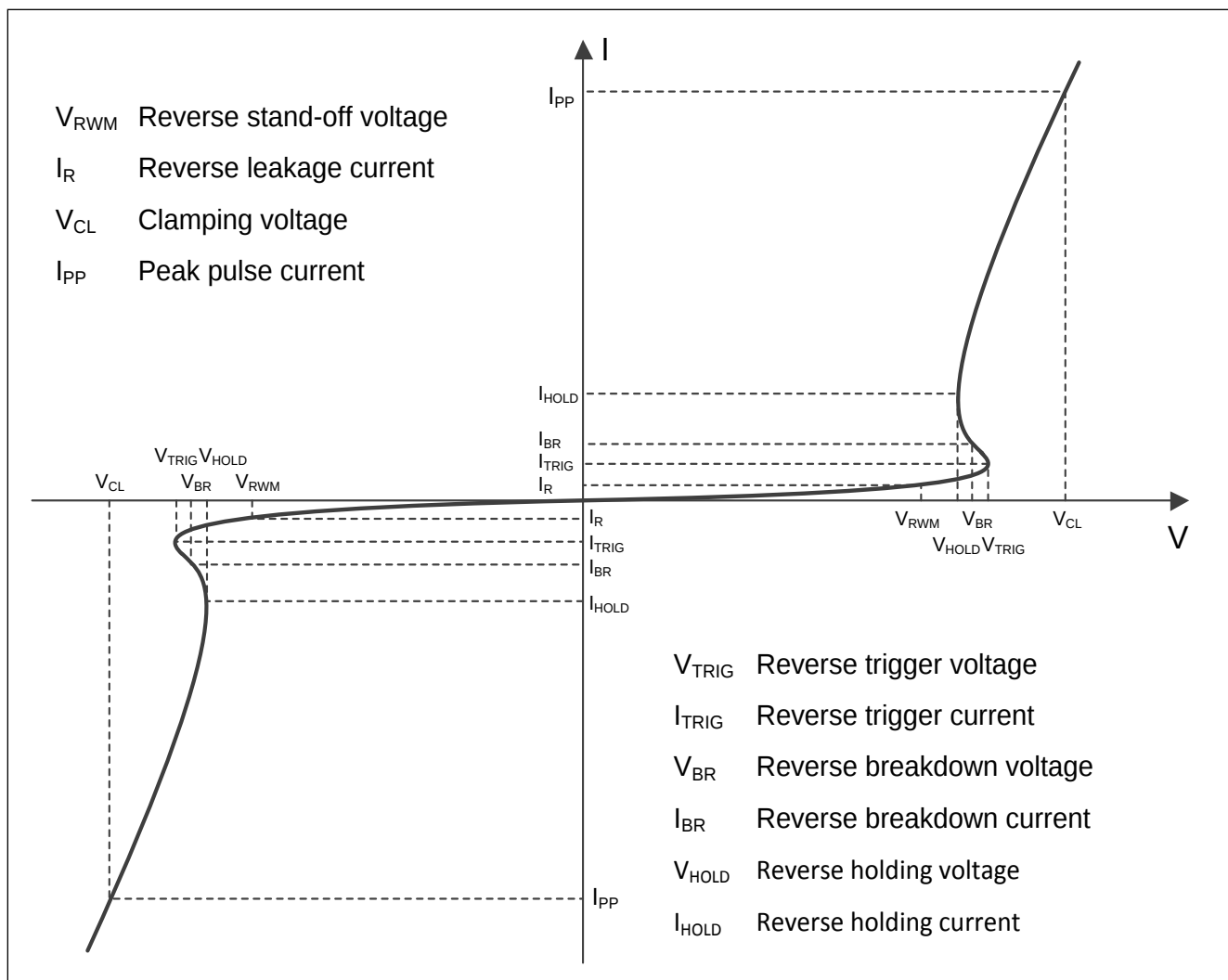
Order information

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}	± 30	kV
ESD according to IEC61000-4-2 contact discharge		± 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)



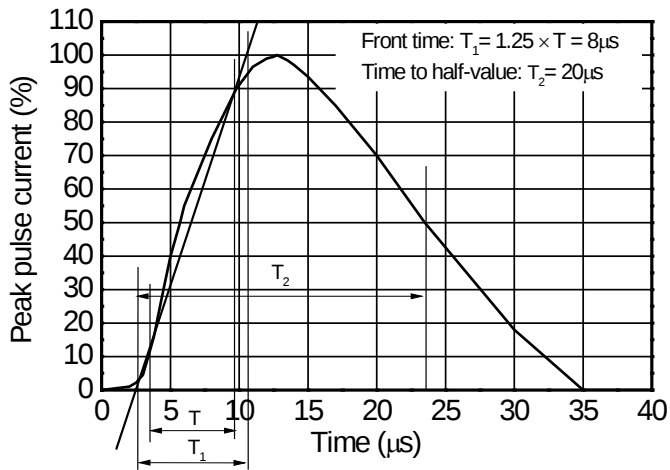
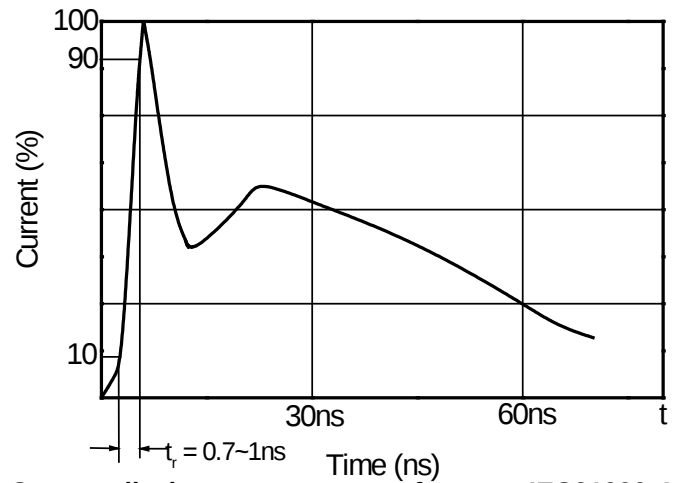
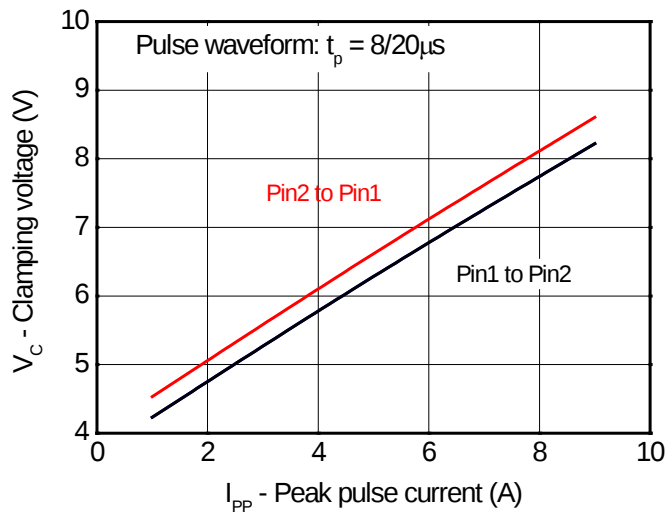
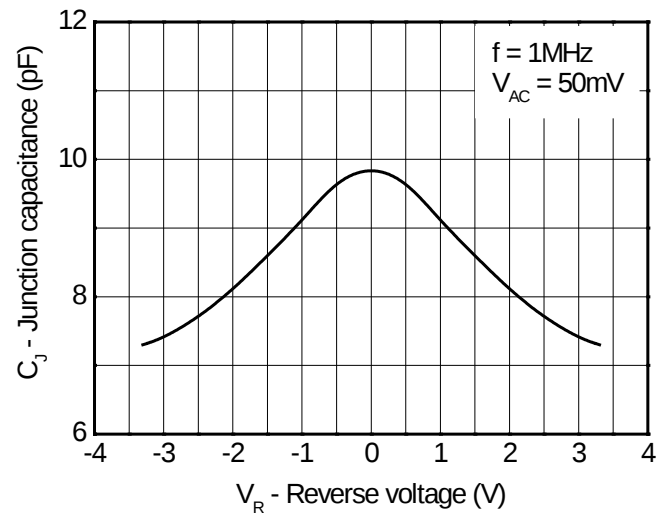
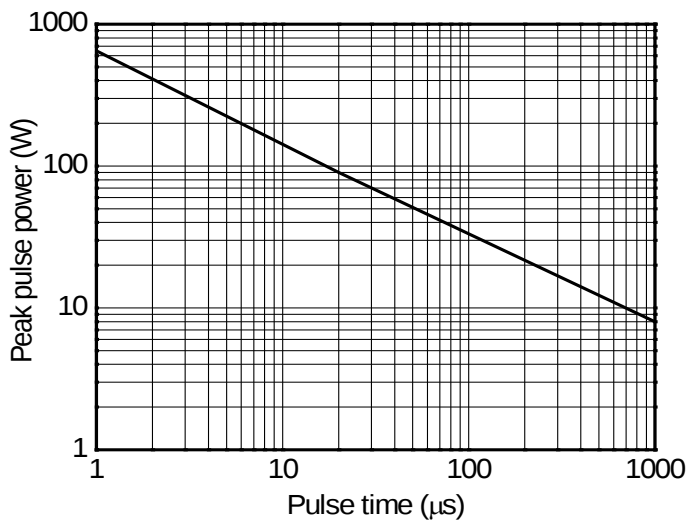
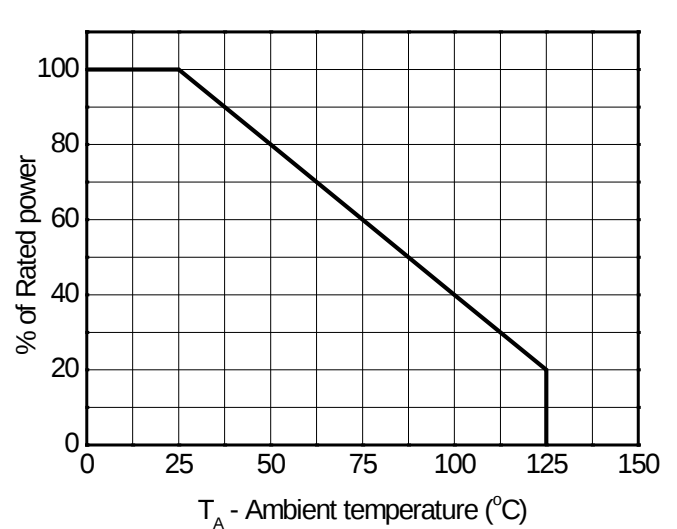
Definitions of electrical characteristics

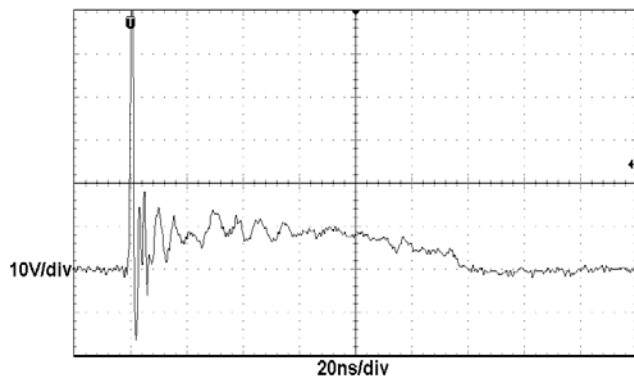
Electrical characteristics ($T_A=25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	V_{RWM}				± 3.3	V
Reverse leakage current	I_{R}	$V_{\text{RWM}} = 3.3\text{V}$		11	100	nA
Reverse breakdown voltage	V_{BR}	$I_{\text{BR}} = 1\text{mA}$	3.3			V
Reverse holding voltage	V_{HOLD}	$I_{\text{HOLD}} = 50\text{mA}$	3.3			V
Clamping voltage ¹⁾	V_{CL}	$I_{\text{PP}} = 16\text{A}$, $t_{\text{p}} = 100\text{ns}$		9		V
Clamping voltage ²⁾	V_{CL}	$V_{\text{ESD}} = 8\text{kV}$		9		V
Clamping voltage ³⁾	V_{CL}	$I_{\text{PP}} = 1\text{A}$, $t_{\text{p}} = 8/20\mu\text{s}$			6	V
		$I_{\text{PP}} = 5\text{A}$, $t_{\text{p}} = 8/20\mu\text{s}$			8	V
		$I_{\text{PP}} = 9\text{A}$, $t_{\text{p}} = 8/20\mu\text{s}$			10	V
Dynamic resistance ¹⁾	R_{DYN}			0.20		Ω
Junction capacitance	C_{J}	$V_{\text{R}} = 0\text{V}$, $f = 1\text{MHz}$		9.9	12	pF
		$V_{\text{R}} = 3.3\text{V}$, $f = 1\text{MHz}$		7.4	9	pF

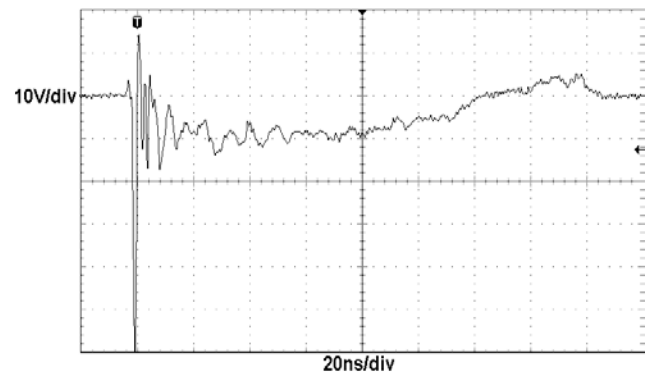
Notes:

- 1) TLP parameter: $Z_0 = 50\Omega$, $t_{\text{p}} = 100\text{ns}$, $t_{\text{r}} = 2\text{ns}$, averaging window from 60ns to 80ns. R_{DYN} 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.

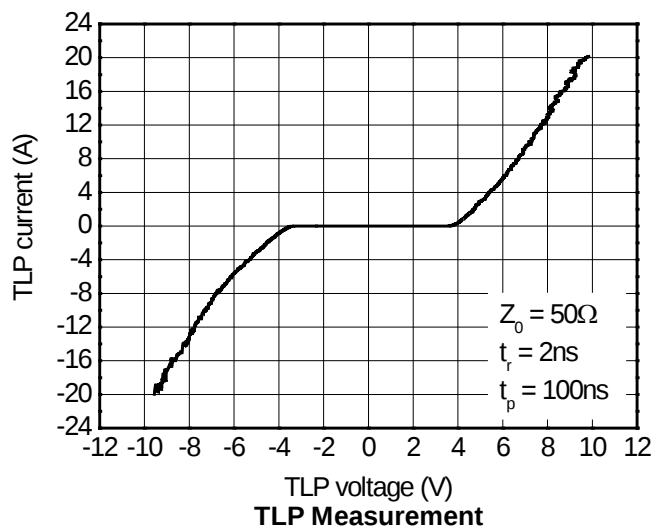
Typical characteristics ($T_A=25^\circ\text{C}$, unless otherwise noted)

8/20 μs waveform per IEC61000-4-5

Contact discharge current waveform per IEC61000-4-2

Clamping voltage vs. Peak pulse current

Capacitance vs. Reverses voltage

Non-repetitive peak pulse power vs. Pulse time

Power derating vs. Ambient temperature



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

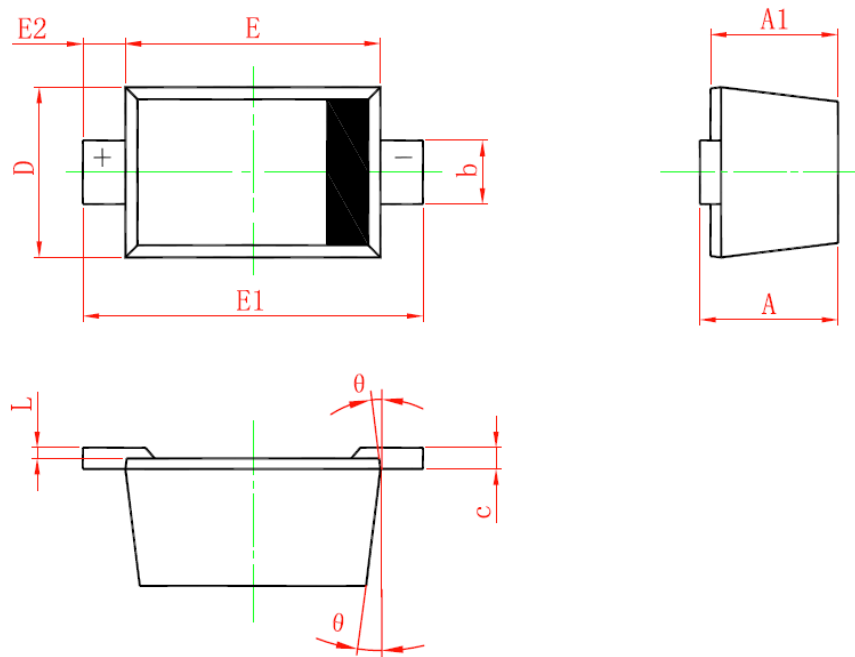


ESD clamping
(-8kV contact discharge per IEC61000-4-2)



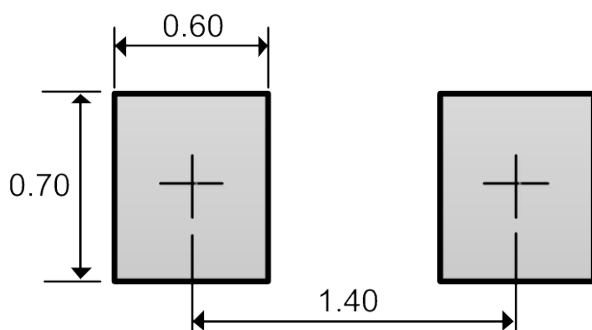
Package outline dimensions

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.