ESD9X5VL

1-Line, Uni-directional, Ultra-low Capacitance Transient Voltage Suppressor

http//:www.sh-willsemi.com

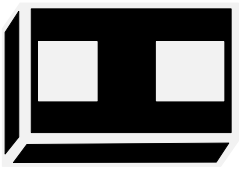
Descriptions

The ESD9X5VL is a Uni-directional transient voltage suppressor (TVS) which provide a very high level protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). It is designed to replace multilayer varistors (MLV) in consumer equipment applications such as mobile phone, notebook, PAD, STB, LCD TV etc.

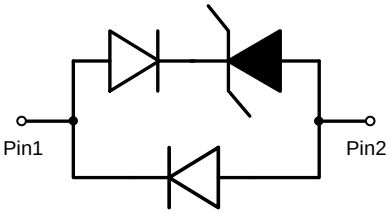
The ESD9X5VL incorporates one pair of ultra-low capacitance steering diodes plus a TVS diode.

The ESD9X5VL may be used to provide ESD protection up to ±20kV (contact and air discharge) according to IEC61000-4-2, and withstand peak pulse current up to 4A for 8/20μs pulse according to IEC61000-4-5.

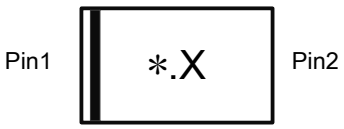
The ESD9X5VL is available in FBP-02C package. Standard products are Pb-free and Halogen-free.



FBP-02C (Bottom View)



Circuit diagram



* = Month code (A~Z)

.X= Device code

Marking (Top View)

Features

- Stand-off voltage: 5V max.
- Transient protection for each line according to
  IEC61000-4-2 (ESD): ±20kV (contact and air discharge)
  IEC61000-4-4 (EFT): 40A (5/50ns)
  IEC61000-4-5 (surge): 4A (8/20μs)
- Ultra-low capacitance: C_J = 1.2pF typ.
- Ultra-low leakage current: I_R <1nA typ.
- Low clamping voltage: V_{CL} = 18V typ. @ I_{PP} = 16A (TLP)
- Solid-state silicon technology

Applications

- USB 2.0 and USB 3.0
- HDMI 1.3 and HDMI 1.4
- SATA and eSATA
- DVI
- IEEE 1394
- PCI Express
- Portable Electronics and Notebooks

Order information

Device	Package	Shipping
ESD9X5VL-2/TR	FBP-02C	10000/Tape&Reel

Absolute maximum ratings

Parameter	Symbol	Rating	Unit
Peak pulse power (t_p = 8/20μs)	P_{pk}	60	W
Peak pulse current (t_p = 8/20μs)	I_{PP}	4	A
ESD according to IEC61000-4-2 air discharge	V_{ESD}	±20	kV
ESD according to IEC61000-4-2 contact discharge		±20	
Junction temperature	T_J	125	°C
Operation temperature	T_{OP}	-40~85	°C
Lead temperature	T_L	260	°C
Storage temperature	T_{STG}	-55~150	°C

Electrical characteristics (T_A = 25°C, unless otherwise noted)

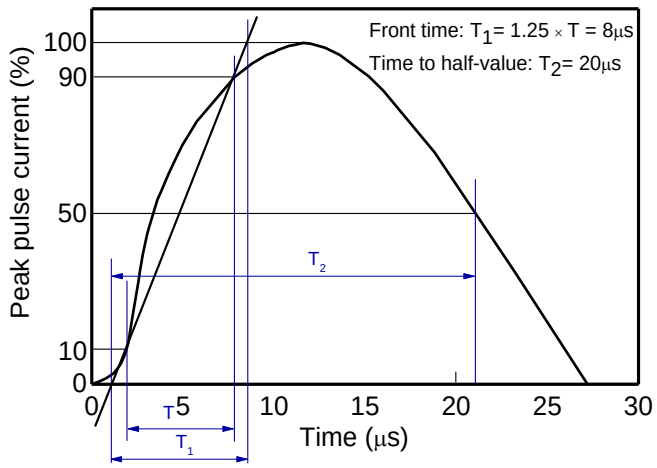
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse maximum working voltage	V_{RWM}				5.0	V
Reverse leakage current	I_R	V_{RWM} = 5V		<1	100	nA
Reverse breakdown voltage	V_{BR}	I_{BR} = 1mA	7.0	8.0	9.0	V
Forward voltage	V_F	I_F = 10mA	0.6	0.9	1.2	V
Clamping voltage [1]	V_{CL}	I_{PP} = 16A, t_p = 100ns		18.0		V
Dynamic resistance [1]	R_{DYN}			0.59		Ω
Clamping voltage [2]	V_{CL}	I_{PP} = 1A, t_p = 8/20μs			11.0	V
		I_{PP} = 4A, t_p = 8/20μs			15.0	V
Junction capacitance	C_J	V_R = 0V, f = 1MHz		1.2	1.6	pF

Notes:

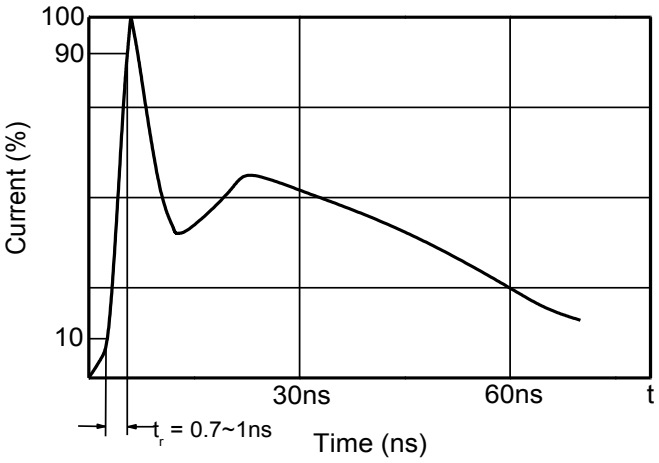
1) *TLP parameter: Z_0 = 50 Ω, t_p = 100ns, t_r = 2ns, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.*

2) *Non-repetitive current pulse, according to IEC61000-4-5.*

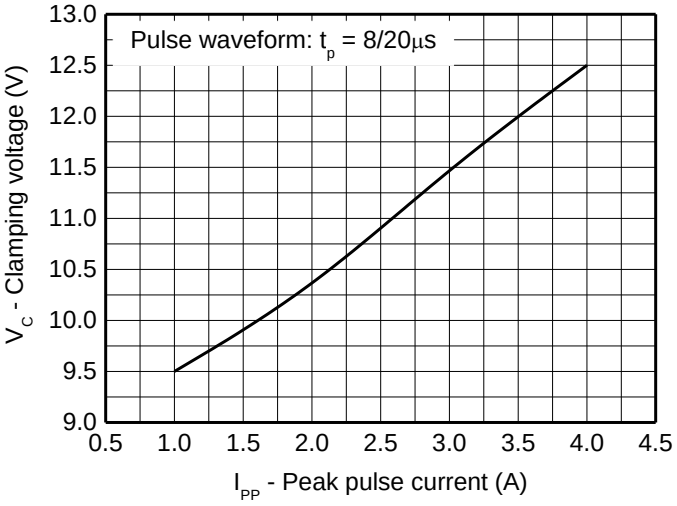
Typical characteristics (T_A = 25°C, unless otherwise noted)



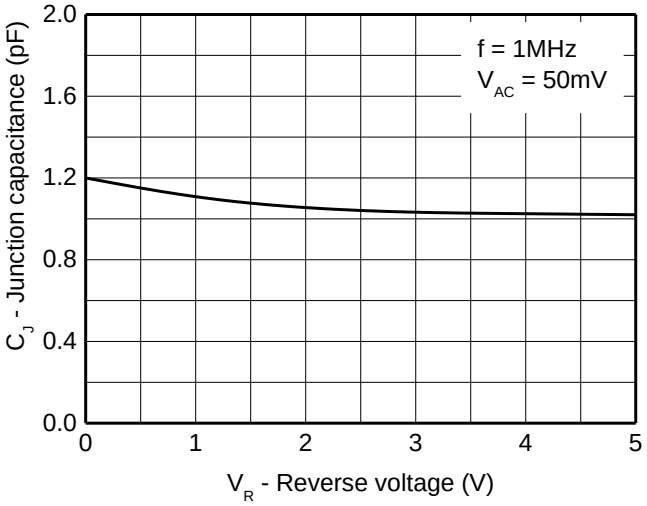
8/20μs waveform per IEC61000-4-5



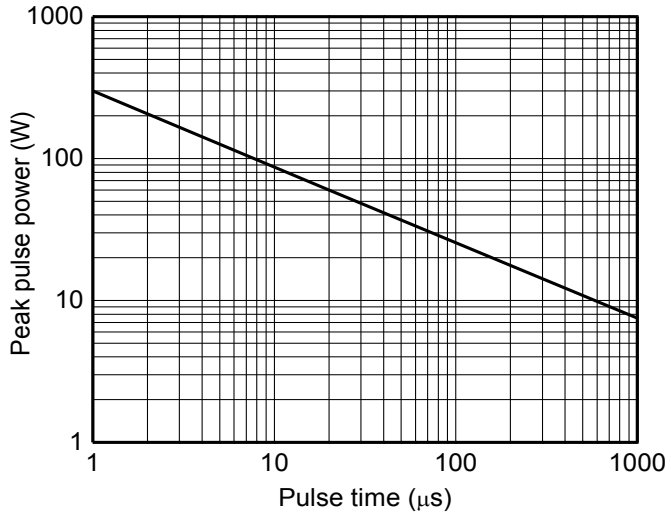
Contact discharge current waveform per IEC61000-4-2



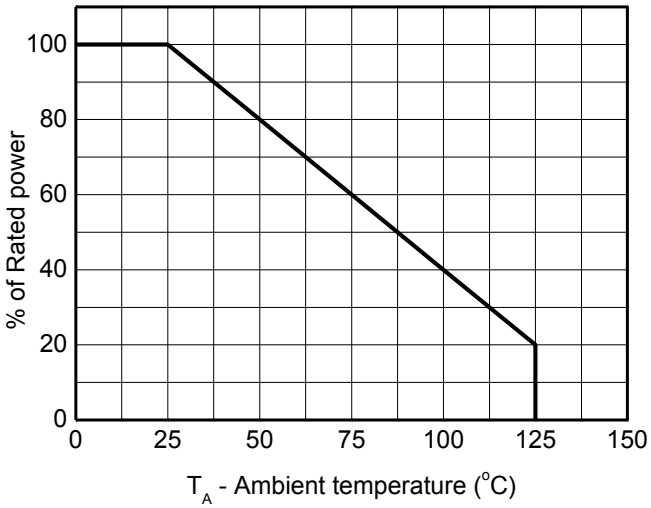
Clamping voltage vs. Peak pulse current



Capacitance vs. Reverse voltage

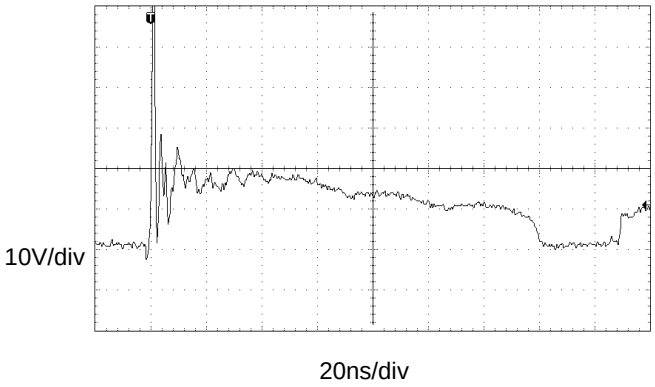


Non-repetitive peak pulse power vs. Pulse time

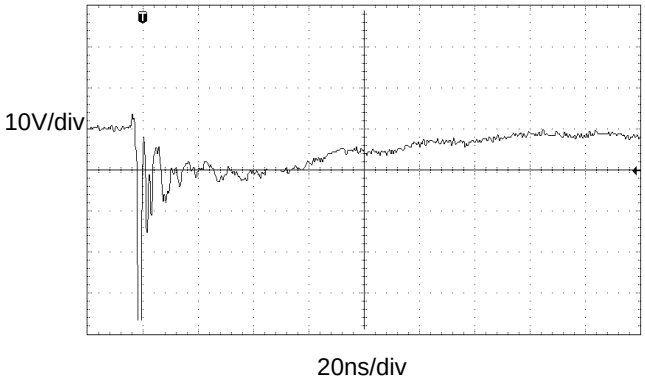


Power derating vs. Ambient temperature

Typical characteristics (T_A = 25°C, unless otherwise noted)



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



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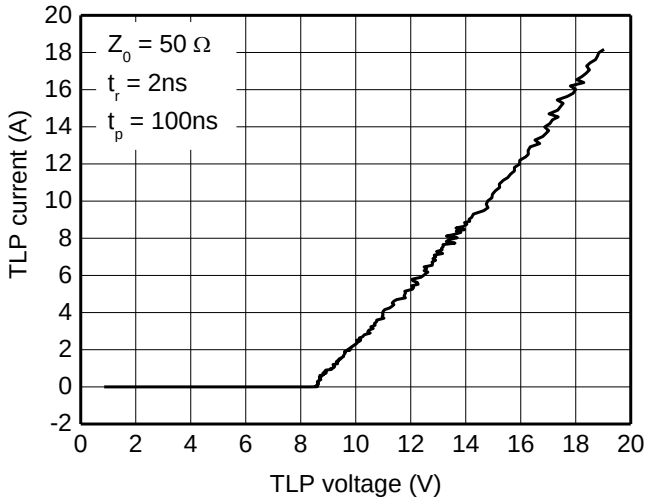
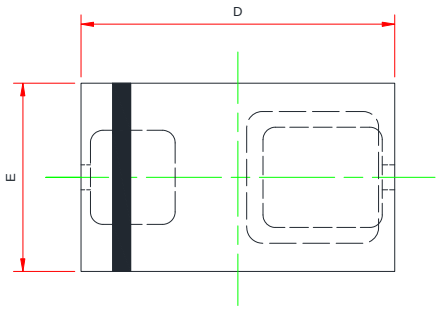


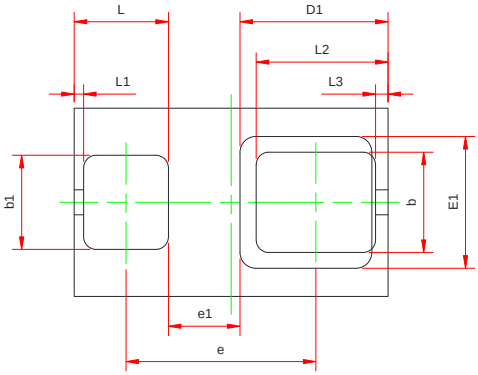
TLP Measurement

Package outline dimensions

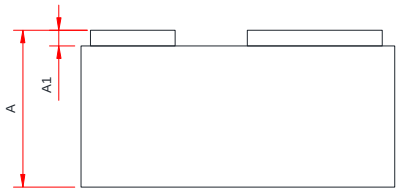
FBP-02C



Top View



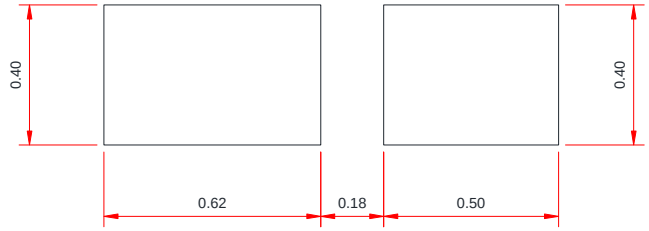
Bottom View



Side View

Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.450	0.500	0.550
A1	0.010	--	0.100
D	0.950	1.000	1.050
E	0.550	0.600	0.650
D1	0.470 Ref.		
E1	0.420 Ref.		
b	0.270	0.320	0.370
b1	0.250	0.300	0.350
e	0.555	0.605	0.655
e1	0.230 Ref.		
L	0.250	0.300	0.350
L1	0.030 Ref.		
L2	0.370	0.420	0.470
L3	0.040 Ref.		

Recommended land pattern (Unit: mm)

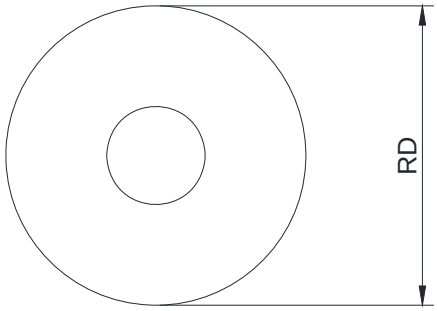


Notes:

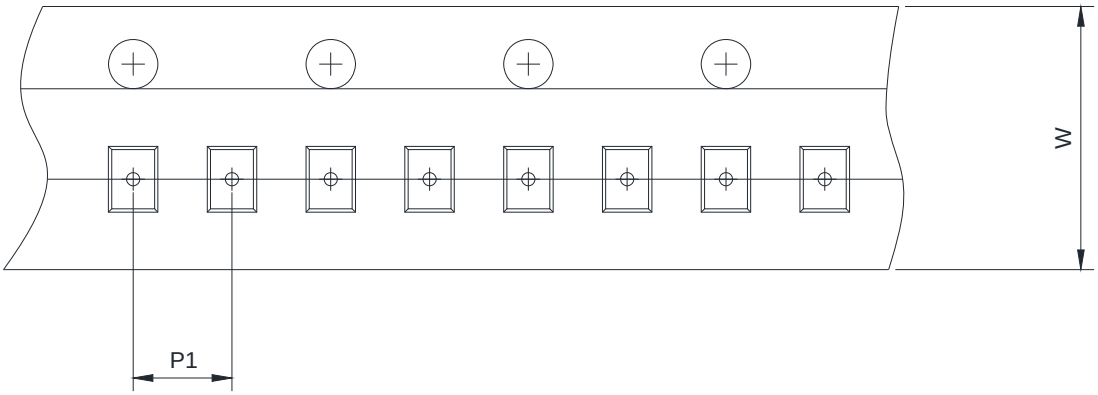
This recommended land pattern is for reference purposes only. Please consult your manufacturing group to ensure your PCB design guidelines are met.

TAPE AND REEL INFORMATION

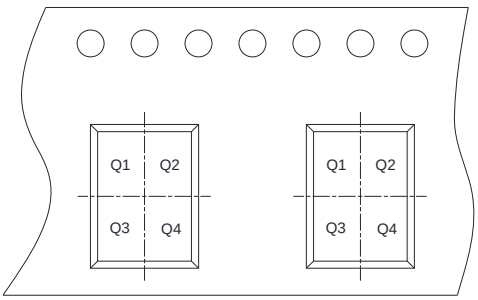
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



User Direction of Feed

RD	Reel Dimension	☑ 7inch	☐ 13inch		
W	Overall width of the carrier tape	☑ 8mm	☐ 12mm	☐ 16mm	
P1	Pitch between successive cavity centers	☑ 2mm	☐ 4mm	☐ 8mm	
Pin1	Pin1 Quadrant	☑ Q1	☑ Q2	☐ Q3	☐ Q4

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