ESD9B5VL

1-Line, Bi-directional, Transient Voltage Suppressor

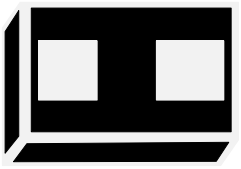
http//:www.sh-willsemi.com

Descriptions

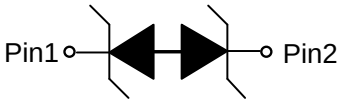
The ESD9B5VL is a bi-directional TVS (Transient Voltage Suppressor). It is specifically designed to protect sensitive electronic components which are connected to low speed data lines and control lines from over-stress caused by ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and Lightning.

The ESD9B5VL 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 3A (8/20μs) according to IEC61000-4-5.

The ESD9B5VL is available in FBP-02C package. Standard products are Pb-free and Halogen-free.



FBP-02C (Bottom View)



Circuit diagram

* = Month code (A~Z)

.B =Device Code

Marking (Top View)

Features

- Reverse 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): 20A (5/50ns)
  IEC61000-4-5 (surge): 3A (8/20μs)
- Capacitance: C_J = 5.0pF typ.
- Low leakage current: I_R < 1nA typ.
- Low clamping voltage: V_{CL} = 13V typ. @ I_{PP} = 16A (TLP)
- Solid-state silicon technology

Applications

- Cellular handsets
- Tablets
- Laptops
- Other portable devices
- Network communication devices

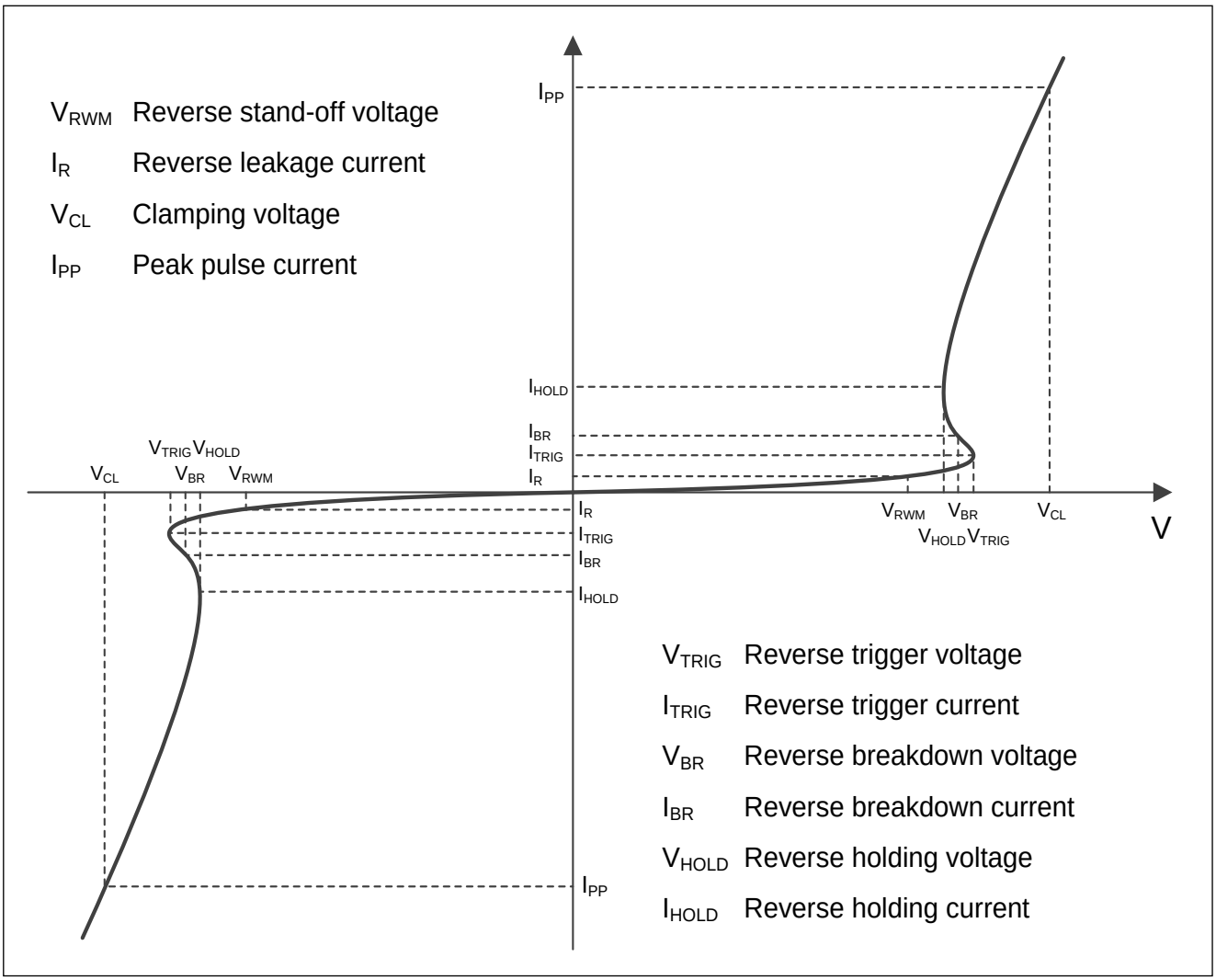
Order information

Device	Package	Shipping
ESD9B5VL-2/TR	FBP-02C	10000/Tape&Reel

Absolute maximum ratings

Parameter	Symbol	Rating	Unit
Peak pulse power (t_p = 8/20μs)	P_{pk}	33	W
Peak pulse current (t_p = 8/20μs)	I_{PP}	3	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
Operating 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)



Definitions of electrical characteristics

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

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	V_{RWM}				±5	V
Reverse leakage current	I_R	V_{RWM} = 5V		<1	100	nA
Reverse breakdown voltage	V_{BR}	I_{BR} = 1mA	5.8		8.3	V
Clamping voltage 1)	V_{CL}	I_{PP} = 16A, t_p = 100ns		13		V
Clamping voltage 2)	V_{CL}	V_{ESD} = 8kV		13		V
Clamping voltage 3)	V_{CL}	I_{PP} = 1A, t_p = 8/20μs			8.5	V
		I_{PP} = 3A, t_p = 8/20μs			11	V
Dynamic resistance 1)	R_{DYN}			0.4		Ω
Junction capacitance	C_J	V_R = 0V, f = 1MHz		5.0	7	pF
		V_R = 5V, f = 1MHz		3.6	5	pF

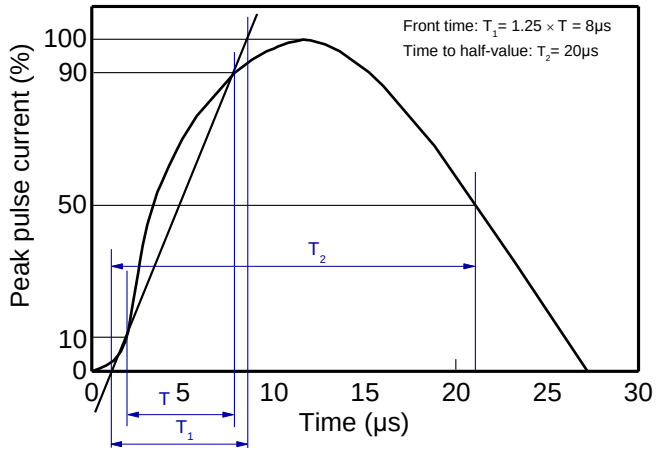
Notes:

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

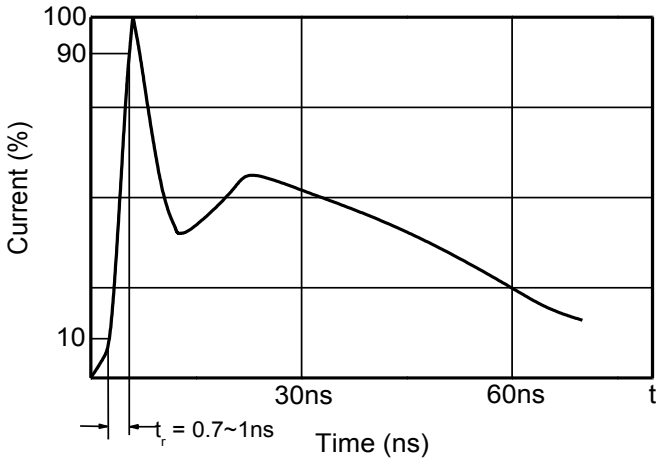
2) Contact discharge mode, according to IEC61000-4-2.

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

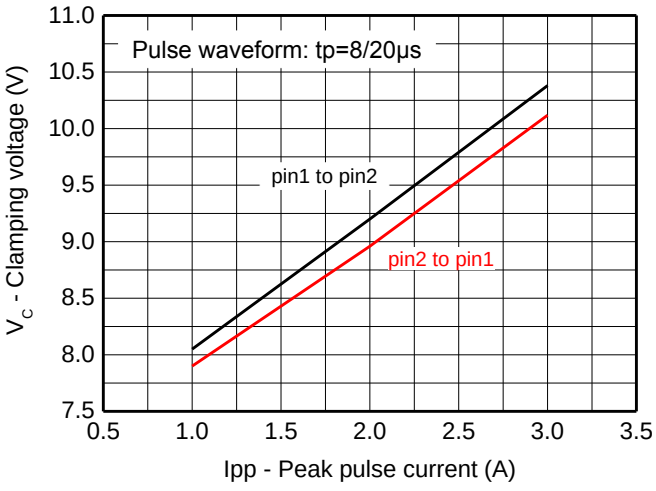
Typical characteristics (T_A=25°C, unless otherwise noted)



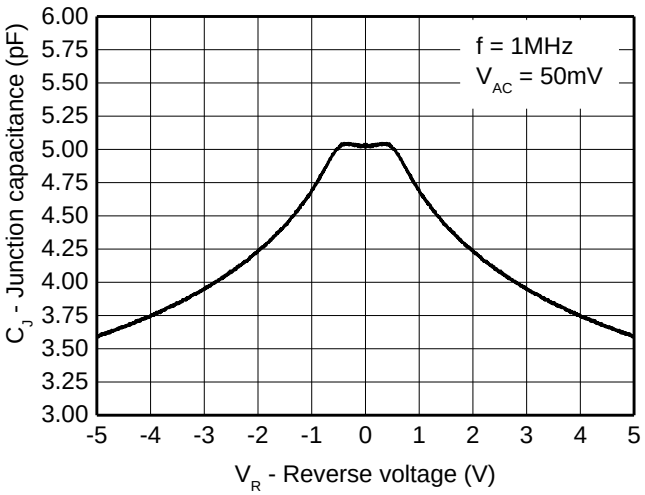
8/20μs waveform per IEC61000-4-5



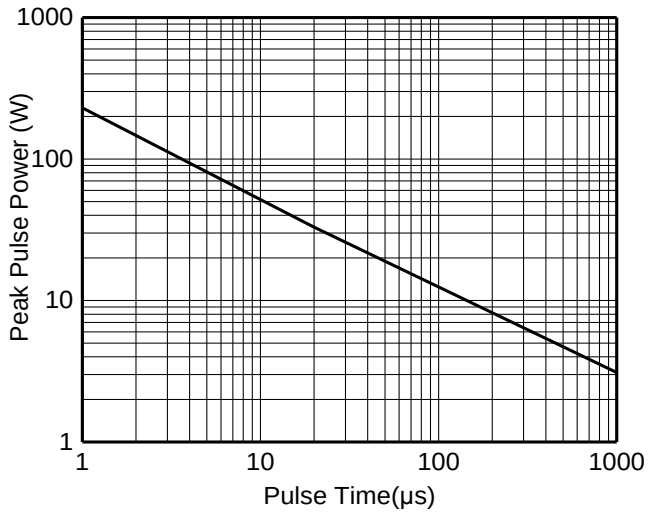
Contact discharge current waveform per IEC61000-4-2



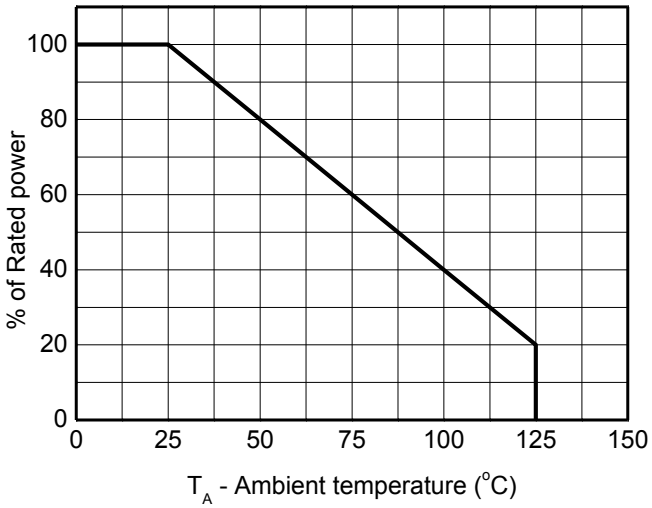
Clamping voltage vs. Peak pulse current



Capacitance vs. Reverse voltage

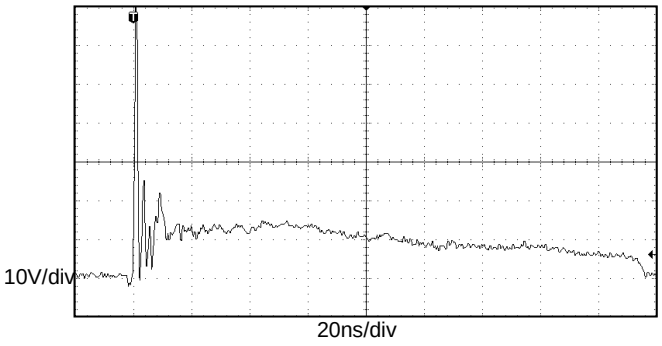


Non-repetitive peak pulse power vs. Pulse time

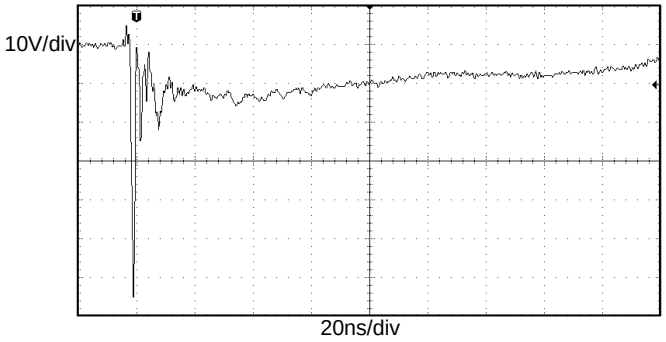


Power derating vs. Ambient temperature

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



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



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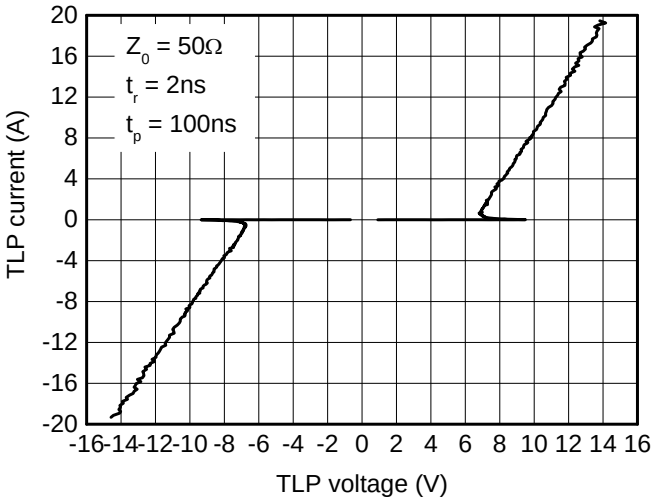
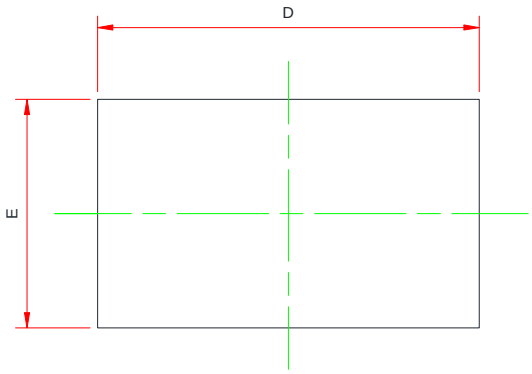
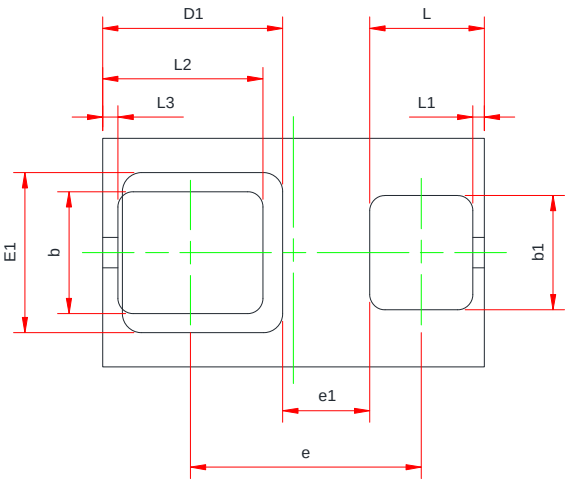


TLP Measurement

Package outline dimensions

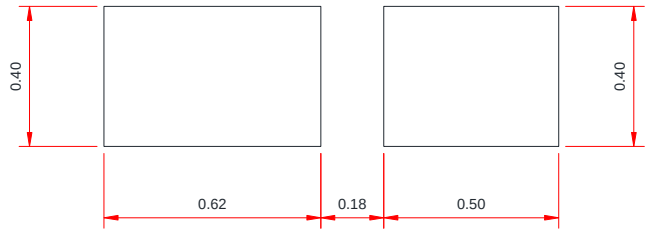
FBP-02C





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.		

Recommend 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.