ESDAVLC6-1BF4

Single-line low capacitance Transil™, transient surge voltage suppressor (TVS)

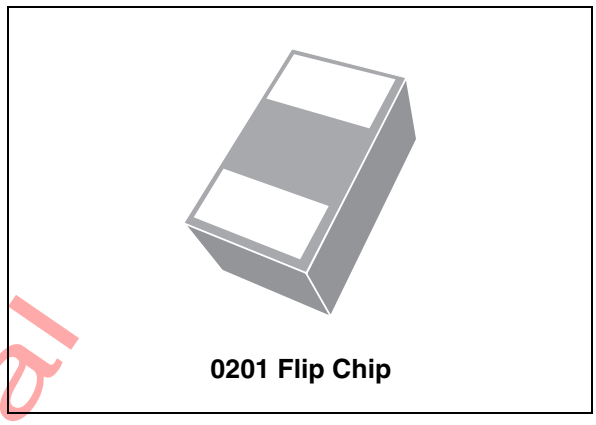
Datasheet – production data

Features

- Bidirectional device
- Multiple ESD strike sustainability
- Very low capacitance: 7 pF max at 0 V
- Low leakage current
- Ultra small PCB area
- RoHS compliant

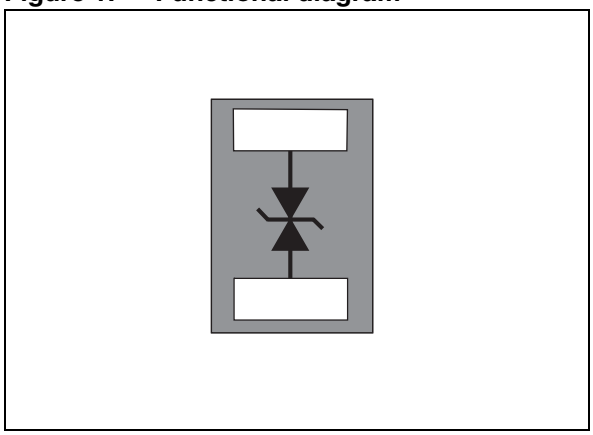
Complies with the following standards

- IEC 61000-4-2:
  - ±15 kV (air discharge)
  - ±8 kV (contact discharge)



0201 Flip Chip

Figure 1. Functional diagram



Applications

Where transient over voltage protection in ESD sensitive equipment is required, such as:

- Portable multiplayers and accessories
- Notebooks
- Digital camera and camcorders
- Communication systems
- Cellular phone handsets and accessories

Description

The ESDAVLC6-1BF4 is a bidirectional single line TVS diode designed to protect the data lines or other I/O ports against ESD transients.

The device is ideal for applications where both reduced line capacitance and board space saving are required.

TM: Transil is a trademark of STMicroelectronics

1 Characteristics

Table 1. Absolute maximum ratings (T_{amb} = 25 °C)

Symbol	Parameter		Value	Unit
V_{PP} (1)	Peak pulse voltage	IEC 61000-4-2 contact discharge IEC 61000-4-2 air discharge	±15	kV
T_{op}	Operating temperature range		-30 to +85	°C
T_{stg}	Storage temperature range		- 55 to +150	°C

1. For a surge greater than the maximum values, the diode will fail in short-circuit.

Figure 2. Electrical characteristics (definitions)

Symbol — Parameter
V_{BR} = Breakdown voltage
V_{RM} = Stand-off voltage
V_{CL} = Clamping voltage
I_{RM} = Leakage current @ V_{RM}
I_{PP} = Peak pulse current
C_{LINE} = Line capacitance

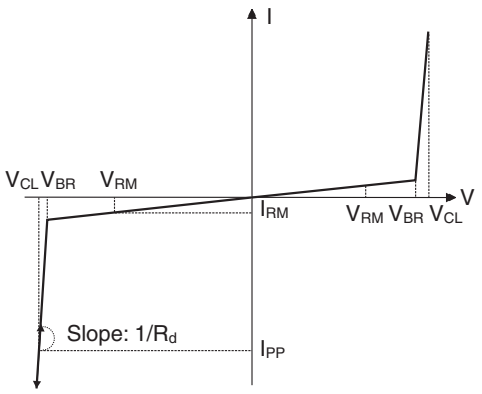


Table 2. Electrical characteristics (values, T_{amb} = 25 °C)

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
V_{BR}	Breakdown voltage	I_R = 1 mA	6		10	V
I_{RM}	Leakage current	V_{RM} = 3 V per line			100	nA
C_{line}	Line capacitance	V_{line} = 0 V, F = 1 MHz, V_{ocs} 30 mV	4		7	pF

Figure 3. ESD response to IEC 61000-4-2 (typical values, +8 kV contact discharge)

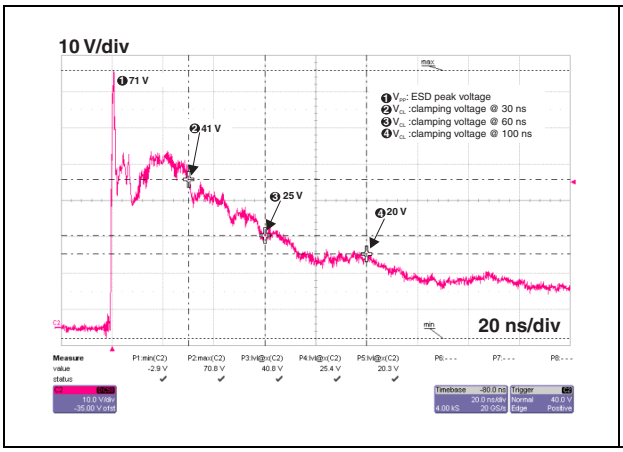


Figure 4. ESD response to IEC 61000-4-2 (typical values, -8 kV contact discharge)

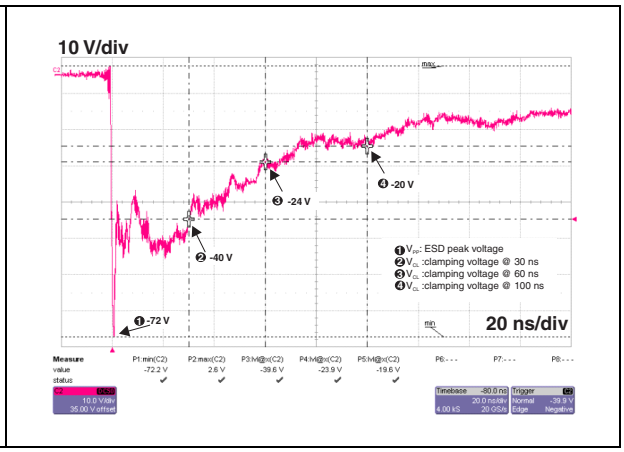


Figure 5. Junction capacitance versus reverse applied voltage (typical values)

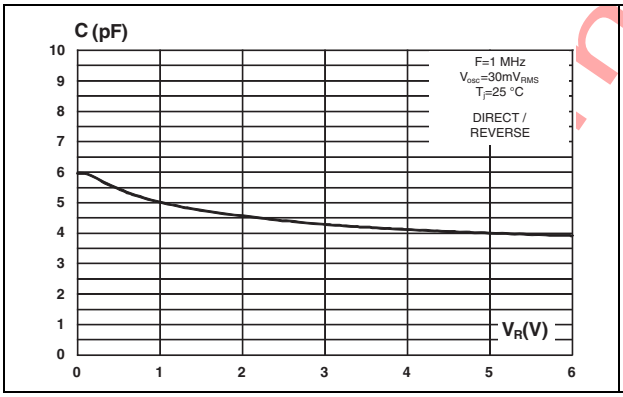


Figure 6. Relative variation of peak pulse power versus initial junction temperature

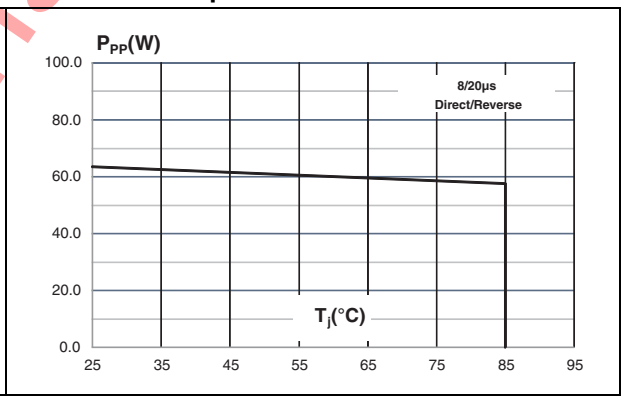


Figure 7. Peak pulse power versus exponential pulse duration

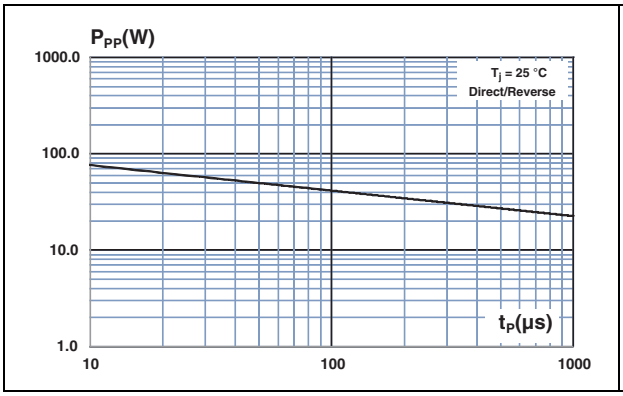
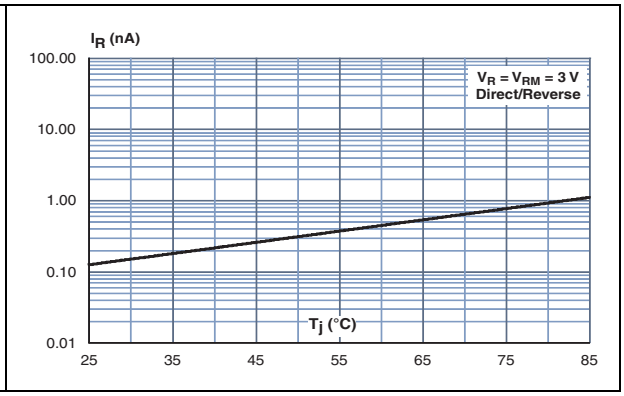
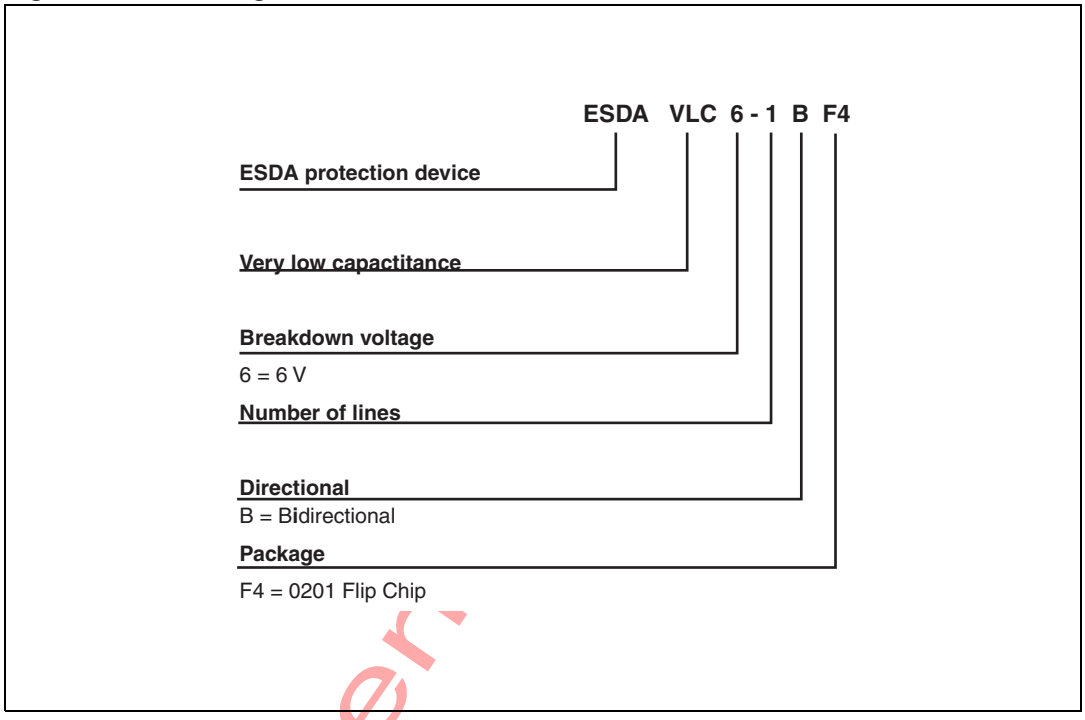


Figure 8. Leakage current versus junction temperature (typical values)



2 Ordering information scheme

Figure 9. Ordering information scheme



3 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Figure 10. 0201 Flip Chip dimension definitions

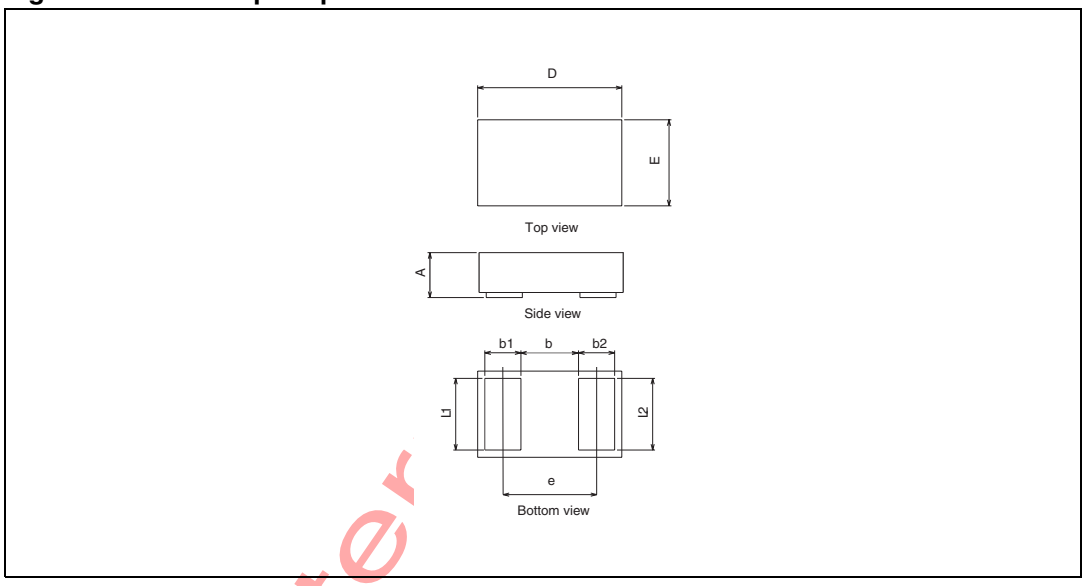
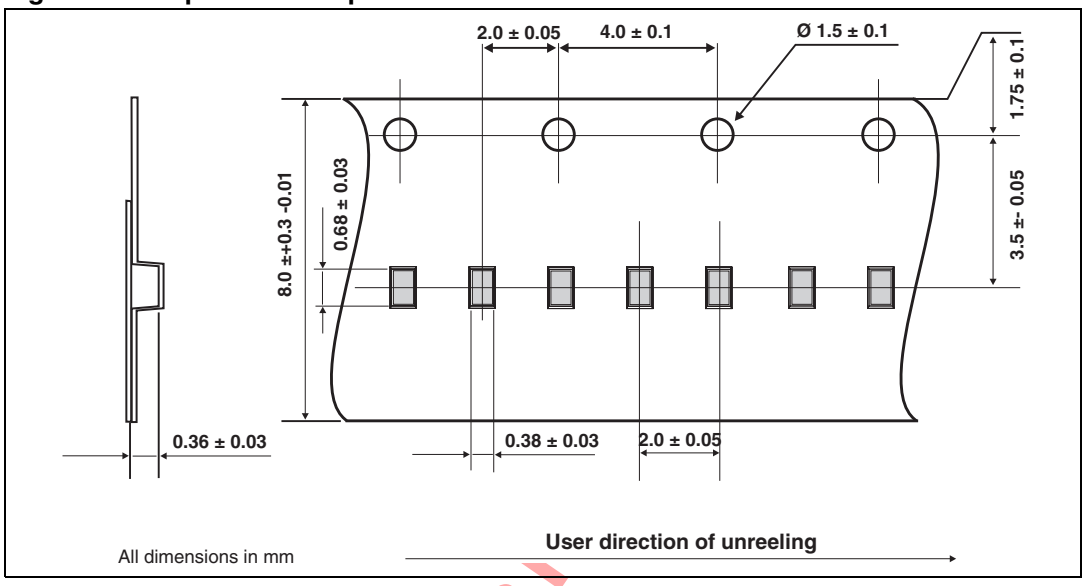


Table 3. 0201 Flip Chip dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.28	0.30	0.32	0.0110	0.0118	0.0126
b	0.19	0.21	0.23	0.0075	0.0082	0.0091
b1	0.125	0.14	0.155	0.0049	0.0055	0.0061
b2	0.125	0.14	0.155	0.0049	0.0055	0.0061
D	0.57	0.60	0.63	0.0224	0.0236	0.0257
e	0.33	0.35	0.37	0.0130	0.0138	0.0146
E	0.27	0.30	0.33	0.0106	0.0118	0.0130
L1	0.175	0.19	0.205	0.0069	0.0075	0.0081
L2	0.175	0.19	0.205	0.0069	0.0075	0.0081

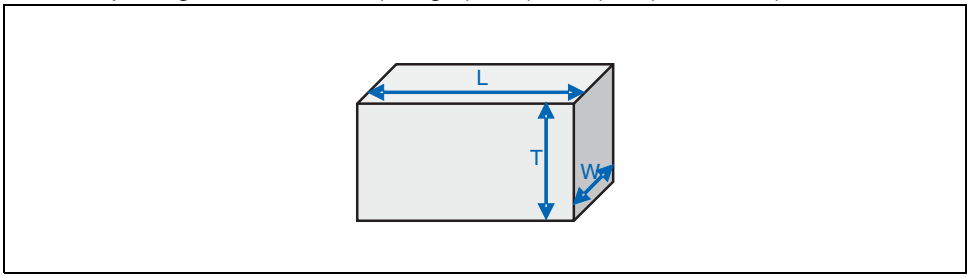
Figure 11. Tape and reel specification



4 Recommendation on PCB assembly

4.1 Stencil opening design

1. General recommendation on stencil opening design
   a) Stencil Opening Dimensions: L (Length), W (Width), T (Thickness).



   b) General Design Rule

   Stencil thickness (T) = 75 ~ 125 µm

$$\text{Aspect Ratio} = \frac{W}{T} \geq 1.5$$

$$\text{Aspect Area} = \frac{L \times W}{2T(L+W)} \geq 0.66$$

2. Reference design
   a) Stencil opening thickness: 100 µm
   b) Stencil opening for leads: Opening to footprint ratio is 60% to 75%.

4.2 Solder paste

1. Halide-free flux qualification ROL0 according to ANSI/J-STD-004.
2. “No clean” solder paste is recommended.
3. Offers a high tack force to resist component movement during high speed
4. Solder paste with fine particles: powder particle size is 20-45 µm.

4.3 Placement

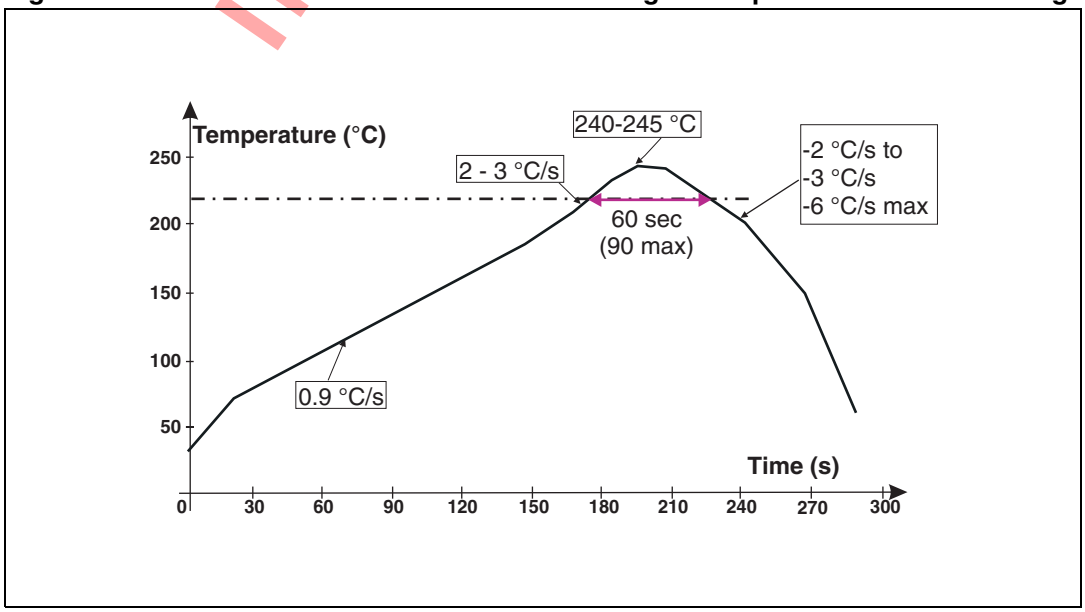
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering
3. Standard tolerance of ± 0.05 mm is recommended.
4. 3.5 N placement force is recommended. Too much placement force can lead to squeezed out solder paste and cause solder joints to short. Too low placement force can lead to insufficient contact between package and solder paste that could cause open solder joints or badly centered packages.
5. To improve the package placement accuracy, a bottom side optical control should be performed with a high resolution tool.
6. For assembly, a perfect supporting of the PCB (all the more on flexible PCB) is recommended during solder paste printing, pick and place and reflow soldering by using optimized tools.

4.4 PCB design preference

1. To control the solder paste amount, the closed via is recommended instead of open vias.
2. The position of tracks and open vias in the solder area should be well balanced. The symmetrical layout is recommended, in case any tilt phenomena caused by asymmetrical solder paste amount due to the solder flow away.

4.5 Reflow profile

Figure 12. ST ECOPACK® recommended soldering reflow profile for PCB mounting



Note: Minimize air convection currents in the reflow oven to avoid component movement.

5 Ordering information

Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
ESDAVLC6-1BF4	None	0201 Flip Chip	0.116 mg	15 000	Tape and reel

6 Revision history

Table 5. Document revision history

Date	Revision	Changes
02-May-2012	1	First issue

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