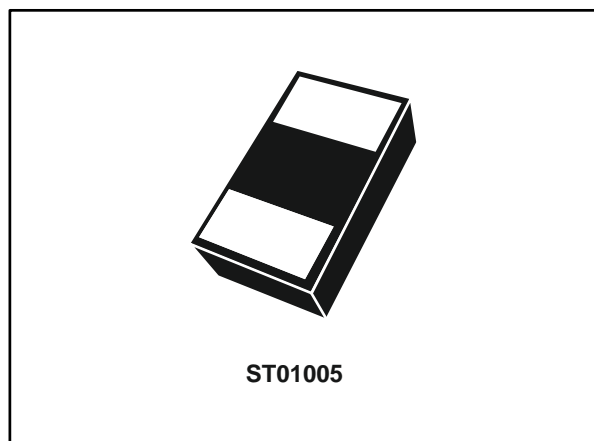


**Single line bidirectional TVS diode for ESD protection**

Datasheet - production data

**Features**

- 01005 package size
- Ultra small PCB area: 0.08 mm<sup>2</sup>
- Bidirectional device
- Low capacitance: 7 pF
- Minimum breakdown voltage:  $V_{BR} = 12\text{ V}$
- Halogen free and RoHS compliant

**Complies with the following standards**

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

**Applications**

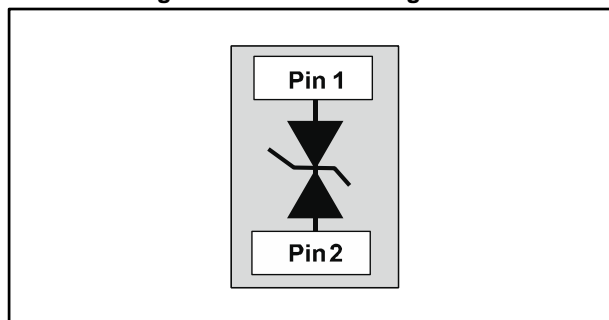
Where transient overvoltage protection in ESD sensitive equipment is required, such as:

- Tablet PCs, netbooks and notebooks
- Portable multimedia devices and accessories
- Digital cameras and camcorders
- Communication and highly integrated systems
- Smartphones, mobile phone and accessories

**Description**

The ESDAVLC12-1BV2 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 printed circuit board space and high ESD protection levels are required.

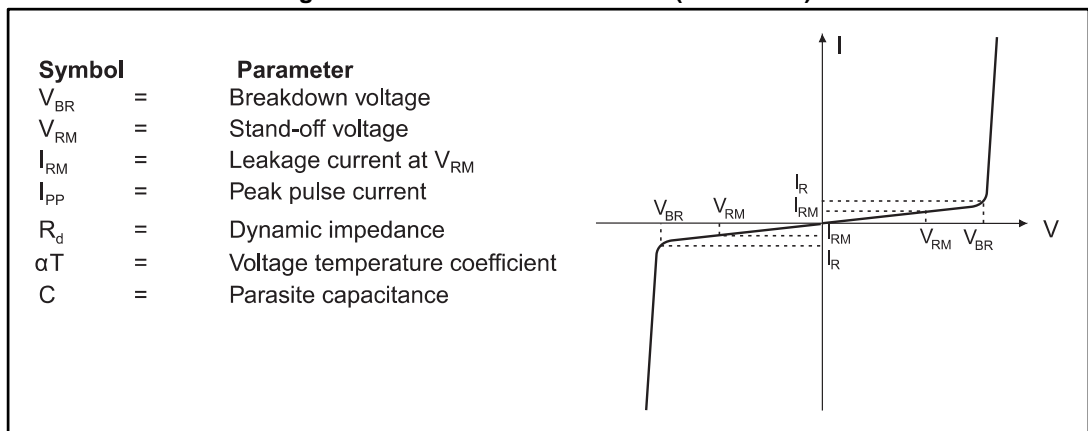
**Figure 1: Functional diagram**

# 1 Characteristics

**Table 1: Absolute ratings ( $T_{amb} = 25\text{ °C}$ )**

| Symbol    | Parameter                                     | Value                               | Unit |    |
|-----------|---|-------------------------------------|------|----|
| $V_{PP}$  | Peak pulse voltage                            | IEC 61000-4-2:<br>Contact discharge | 8    | kV |
|           |   | Air discharge                       | 15   |    |
| $I_{PP}$  | Peak pulse current                            | 8/20 $\mu$ s                        | 1.5  | A  |
| $T_{stg}$ | Storage junction temperature range            | -65 to +150                         | °C   |    |
| $T_j$     | Maximum operating junction temperature        | -40 to +125                         |      |    |
| $T_L$     | Maximum temperature for soldering during 10 s | 260                                 | °C   |    |

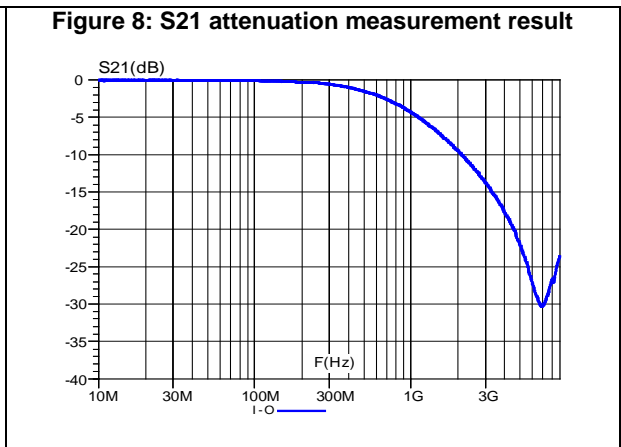
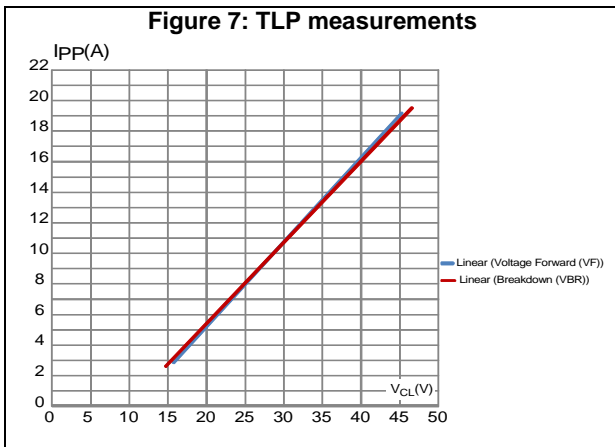
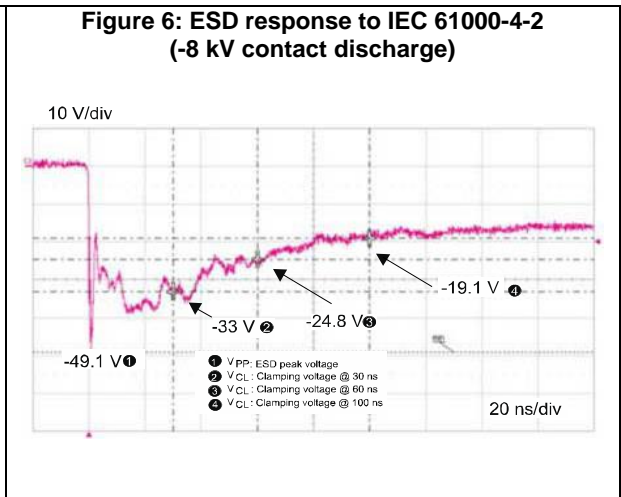
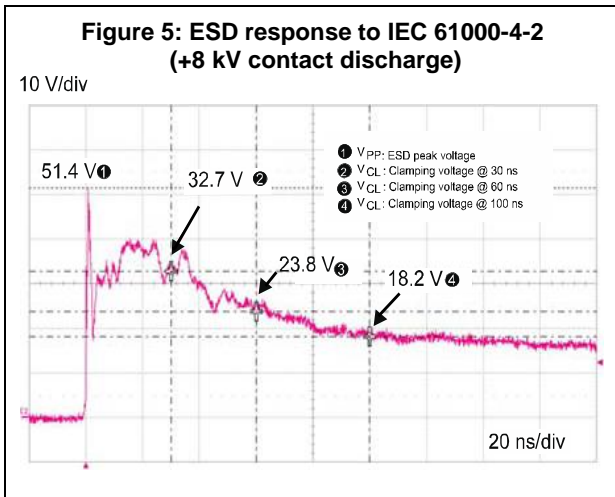
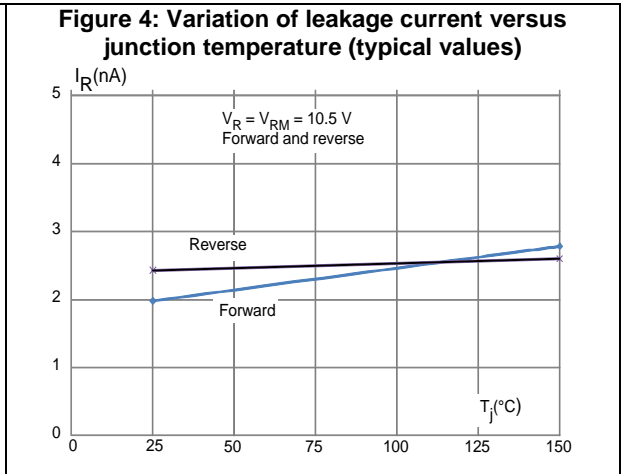
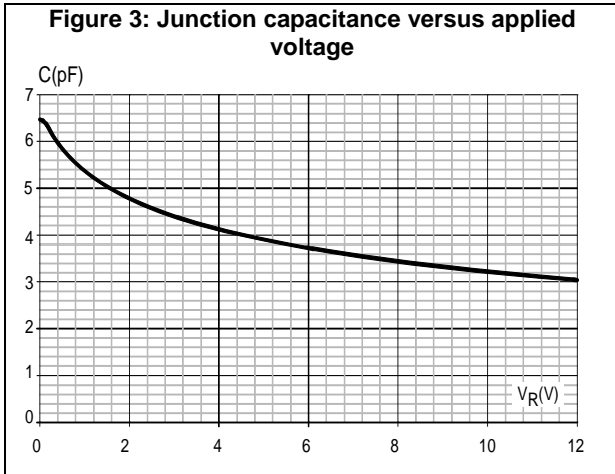
**Figure 2: Electrical characteristics (definitions)**



**Table 2: Electrical characteristics ( $T_{amb} = 25\text{ °C}$ )**

| Symbol     | Test condition                                   | Min. | Typ. | Max. | Unit     |
|------------|--|------|------|------|----------|
| $V_{BR}$   | $I_R = 1\text{ mA}$                              | 12   |      |      | V        |
| $I_{RM}$   | $V_{RM} = 10.5\text{ V}$                         |      | 2.5  | 70   | nA       |
| $R_d$      | Dynamic resistance, 100 ns pulse duration        |      |      | 2    | $\Omega$ |
| $V_{CL}$   | $I_{PP} = 1\text{ A}; 8/20\ \mu\text{s}$         |      |      | 20   | V        |
| $V_{CL}$   | 8 kV contact discharge after 30 ns IEC 61000-4-2 |      | 33   |      |          |
| $C_{line}$ | $F = 1\text{ MHz}, V_R = 0\text{ V}$             |      | 7    | 10   | pF       |

# 1.1 Characteristics (curves)



## 2 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](http://www.st.com). ECOPACK® is an ST trademark.

- Epoxy meets UL 94,V0
- Lead-free package

### 2.1 ST01005 package information

Figure 9: ST01005 package outline

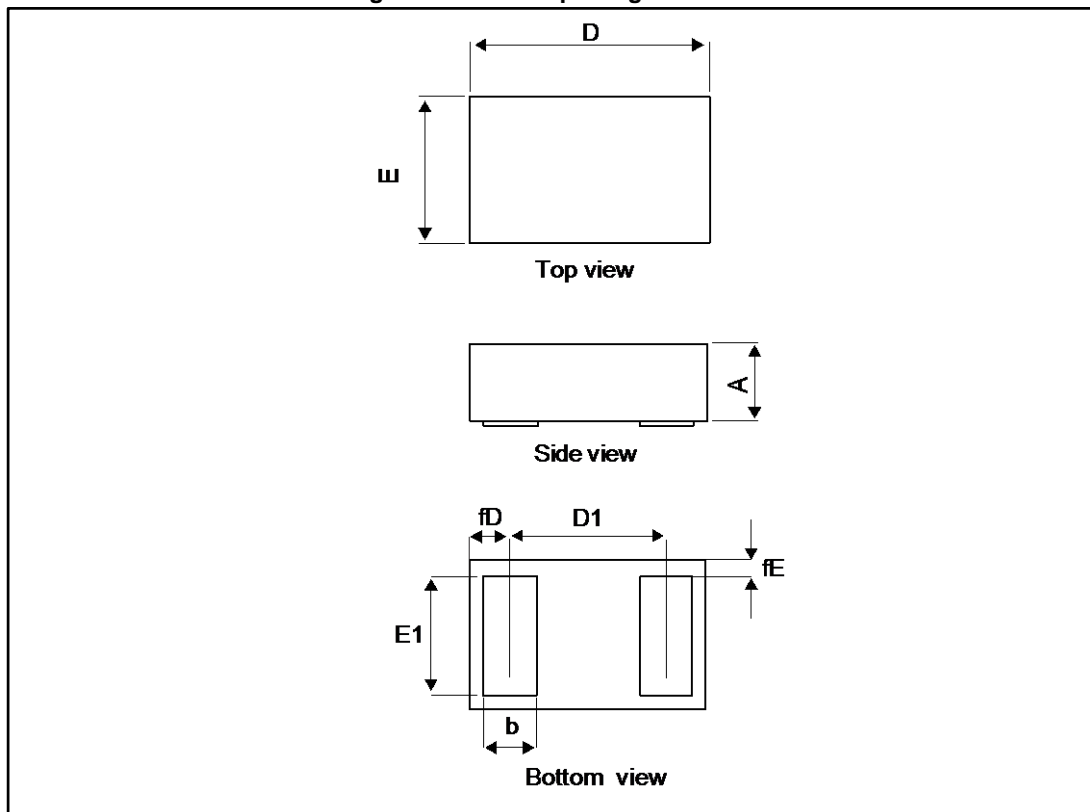


Table 3: ST01005 package mechanical data

| Ref. | Dimensions  |       |       |        |        |        |
|------|-------------|-------|-------|--------|--------|--------|
|      | Millimeters |       |       | Inches |        |        |
|      | Min.        | Typ.  | Max.  | Min.   | Typ.   | Max.   |
| A    | 0.16        | 0.18  | 0.20  | 0.0063 | 0.0071 | 0.0079 |
| b    | 0.094       | 0.104 | 0.114 | 0.0037 | 0.0041 | 0.0045 |
| E    | 0.17        | 0.2   | 0.23  | 0.0067 | 0.0078 | 0.0091 |
| E1   | 0.154       | 0.164 | 0.174 | 0.0061 | 0.0065 | 0.0069 |
| D    | 0.37        | 0.40  | 0.43  | 0.0146 | 0.0157 | 0.0169 |
| D1   |             | 0.26  | 0.6   |        | 0.0102 | 0.0236 |
| fE   | 0.010       | 0.018 | 0.026 | 0.0004 | 0.0007 | 0.0010 |
| fD   | 0.11        | 0.125 | 0.13  | 0.0043 | 0.0049 | 0.0051 |

Figure 10: Footprint recommendations, dimensions in mm (inches)

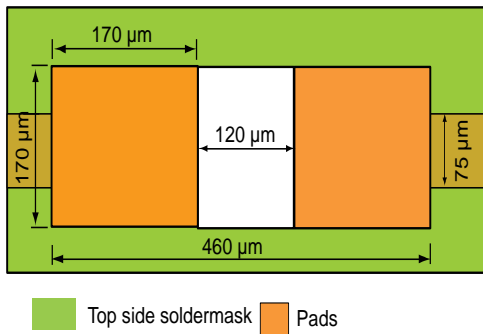
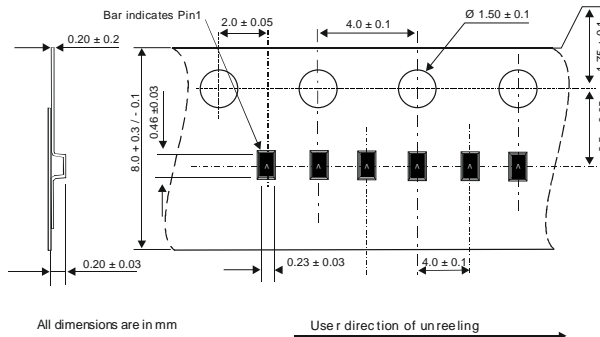


Figure 11: Marking layout



Product marking may be rotated by multiples of 90° for assembly plant differentiation. In no case should this product marking be used to orient the component for its placement on a PCB. Only pin 1 mark is to be used for this purpose.

Figure 12: Tape and reel specifications



### 3 Recommendation on PCB assembly

#### 3.1 Stencil opening design

1. Reference design
  - a. Stencil opening thickness: 75  $\mu\text{m}$

Figure 13: Stencil opening dimensions

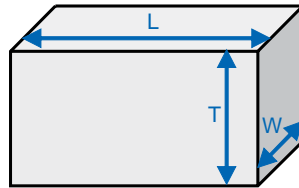
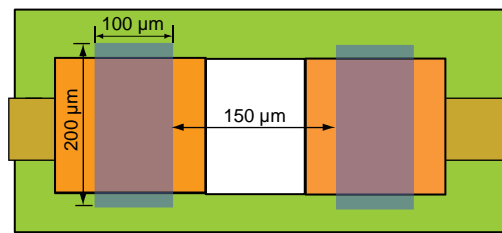


Figure 14: Recommended stencil window position in mm (inches)



Stencil opening

Stencil thickness: 75  $\mu\text{m}$  (3 mils)  
Use of solder paste type 4 mandatory

#### 3.2 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 20-38  $\mu\text{m}$ .

### 3.3 Placement

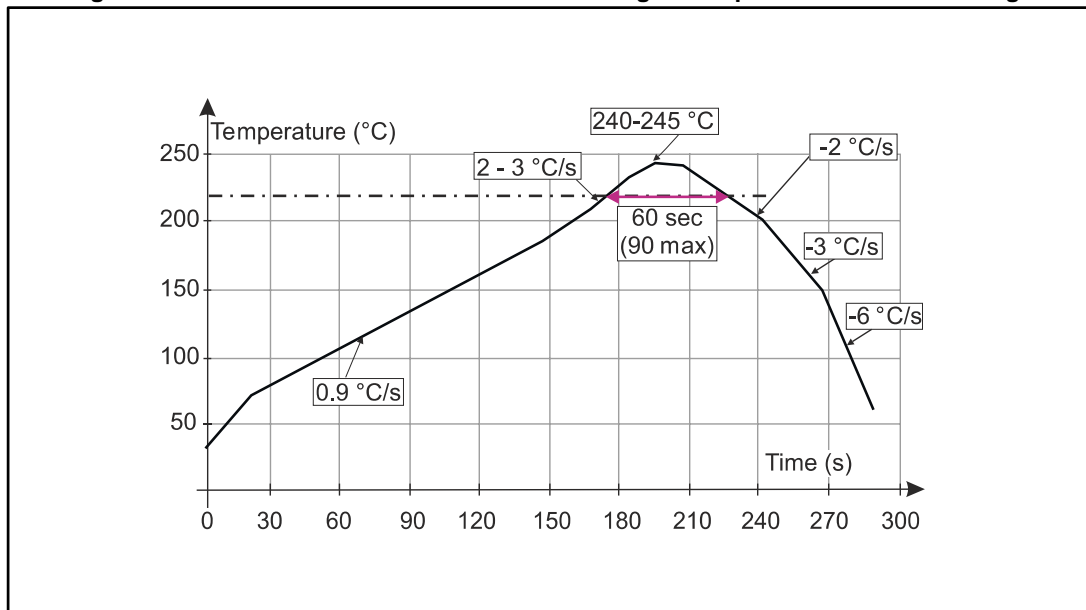
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering
3. Standard tolerance of  $\pm 0.05$  mm is recommended.
4. 3.5 N placement force is recommended. Too much placement force can lead to squeezed out 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.

### 3.4 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. A symmetrical layout is recommended, to avoid any tilt phenomena caused by asymmetrical solder paste due to solder flow away.

### 3.5 Reflow profile

Figure 15: ST ECOPACK® recommended soldering reflow profile for PCB mounting



Minimize air convection currents in the reflow oven to avoid component movement. Maximum soldering profile corresponds to the latest IPC/JEDEC J-STD-020.

## 4 Ordering information

Figure 16: Ordering information scheme

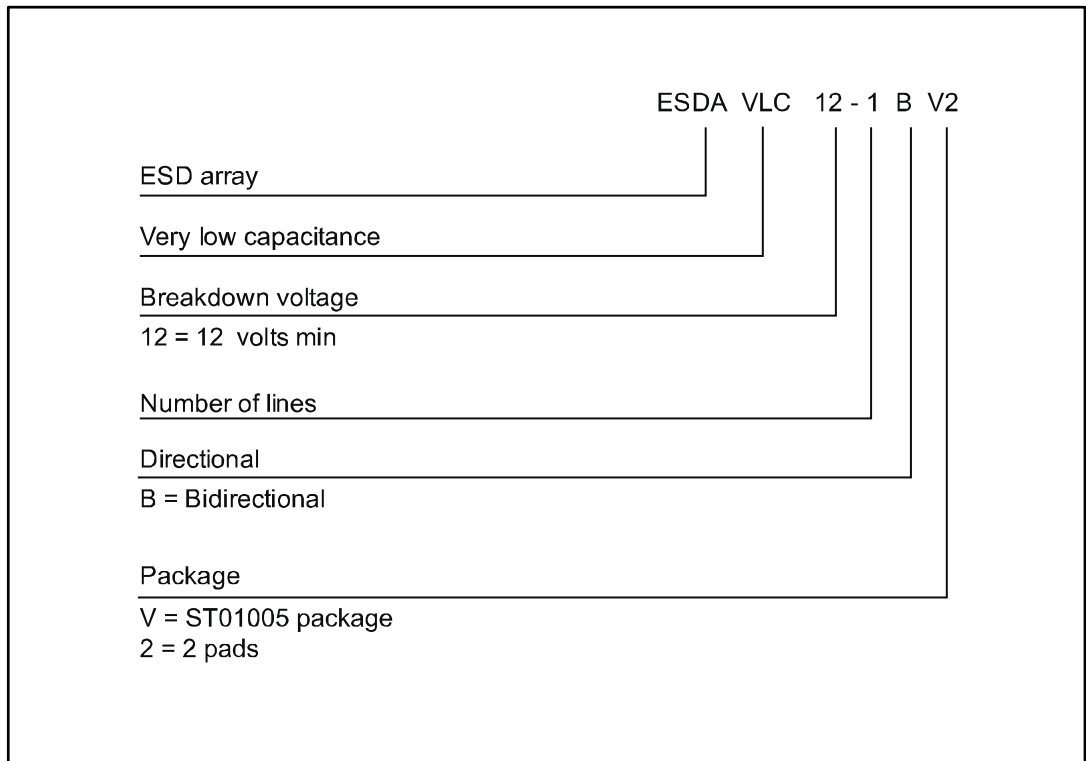


Table 4: Ordering information

| Order code     | Marking <sup>(1)</sup> | Package | Weight   | Base qty. | Delivery mode |
|----------------|------------------------|---------|----------|-----------|---------------|
| ESDAVLC12-1BV2 | V                      | ST01005 | 0.043 mg | 20000     | Tape and reel |

**Notes:**

<sup>(1)</sup>The marking can be rotated by multiples of 90° to differentiate assembly location

## 5 Revision history

Table 5: Document revision history

| Date        | Revision | Changes  |
|-------------|----------|--|
| 02-Dec-2014 | 1        | Initial release.   |
| 23-May-2016 | 2        | Updated <a href="#">Section 9: "Recommendation on PCB assembly"</a> and <a href="#">Section 8.2: "ST01005 package information"</a> . |



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