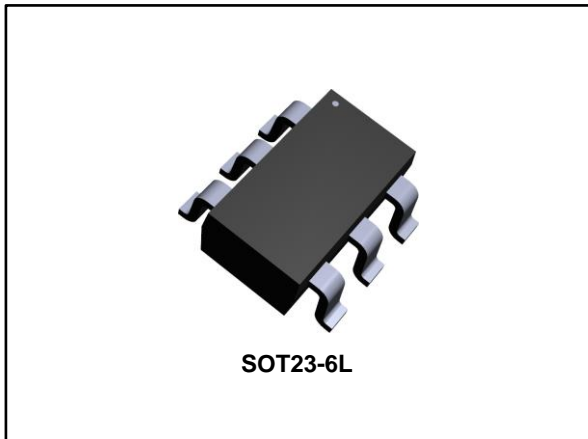


## Secondary protection for VDSL2 and G.FAST lines

Datasheet - production data



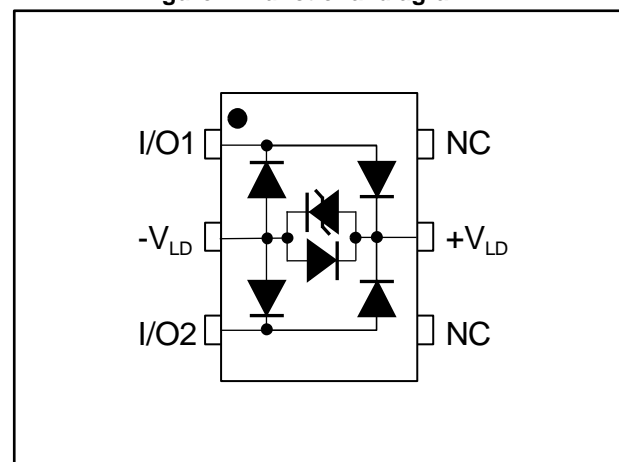
### Description

DSL05 is designed to protect DSL line drivers against surges defined in worldwide telecommunication standards. This device protects line drivers of various systems such as xDSL and G.FAST. The low capacitance makes it suitable from ADSL to G.FAST data rates.

DSL05 is able to survive severe conditions even when used with downgraded or oscillating gas tube.

This device is packaged in a SOT23-6L.

**Figure 1: Functional diagram**



### Features

- High surge capability to comply with GR-1089 and ITU-T K20/21/45
- Keeps peak power capability at high temperature
- Voltages: 8, 12, 16 and 24 V
- Low capacitance device:  $C_{typ} = 0.95 \text{ pF}$
- RoHS package
- Low leakage current: 50 nA at 25 °C

### Complies with the following standards

Refer to [Section 2: "Schematics"](#).

- Telcordia GR-1089
  - 2.5 kV 2/10  $\mu\text{s}$  - 500 A 2/10  $\mu\text{s}$
  - AC power fault tests
- ITU-T K20/21/45
  - 6 kV 10/700  $\mu\text{s}$  - 150 A 5/310  $\mu\text{s}$
  - power induction and contact tests
- IEC 61000-4-2, level 4
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- IEC 61000-4-5, level 2
  - 1 kV, 42  $\Omega$
- MIL STD 883G-Method 3015-7: Class 3
  - 8 kV (human body model)

**Table 1: Device summary**

| Order code   | $V_{RM}(V)$ |
|--------------|-------------|
| DSL05-008SC6 | 8           |
| DSL05-012SC6 | 12          |
| DSL05-016SC6 | 16          |
| DSL05-024SC6 | 24          |

# 1 Characteristics

**Table 2: Absolute ratings ( $T_{amb} = -40$  to  $85$  °C)**

| Symbol    | Parameter                                     | Value        | Unit       |
|-----------|---|--------------|------------|
| $I_{pp}$  | Peak pulse current                            | 8/20 $\mu$ s | A          |
| dl/dt     | Critical rate of on-state current rise        | 1000         | A/ $\mu$ s |
| $T_{stg}$ | Storage junction temperature range            | -55 to +150  | °C         |
| $T_j$     | Maximum operating junction temperature        |              |            |
| $T_L$     | Maximum temperature for soldering during 10 s | 260          | °C         |

**Table 3: Electrical characteristics ( $T_{amb} = 25$  °C, pin 1 to pin 3)**

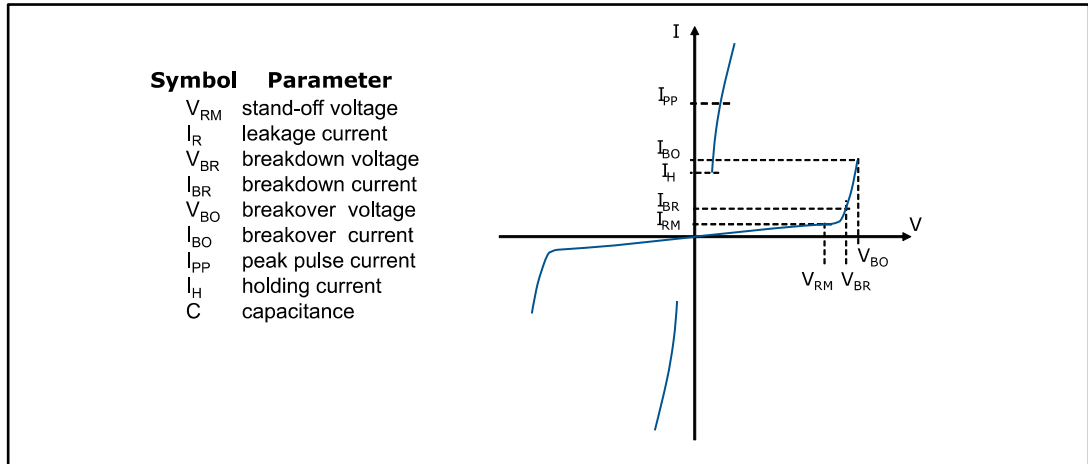
| Order code   | $I_{RM}$ at $V_{RM}$ |      |      |      | $V_{BR}$ at 1 mA | $V_{BO}$ | $I_H$ | $C^{(1)}$ | $\Delta C^{(2)}$ |      |
|--------------|----------------------|------|------|------|------------------|----------|-------|-----------|------------------|------|
|              | Typ.                 | Max. | Typ. | Max. | Min.             | Max.     | Typ.  | Max.      | Typ.             |      |
|              | $T_{amb} = 85$ °C    |      |      |      |                  |          |       |           |                  |      |
|              | nA                   |      |      |      | V                | V        | V     | mA        | pF               | pF   |
| DSL05-008SC6 | 0.1                  | 50   | 7    | 100  | 8                | 9.5      | 15    | 50        | 1.5              | 0.25 |
| DSL05-012SC6 | 0.1                  | 50   | 7    | 100  | 12               | 12.8     | 18    | 10        | 1.5              | 0.25 |
| DSL05-016SC6 | 0.1                  | 50   | 7    | 100  | 16               | 18       | 25    | 30        | 1.5              | 0.25 |
| DSL05-024SC6 | 0.1                  | 50   | 7    | 100  | 24               | 25.5     | 31    | 50        | 1.5              | 0.25 |

**Notes:**

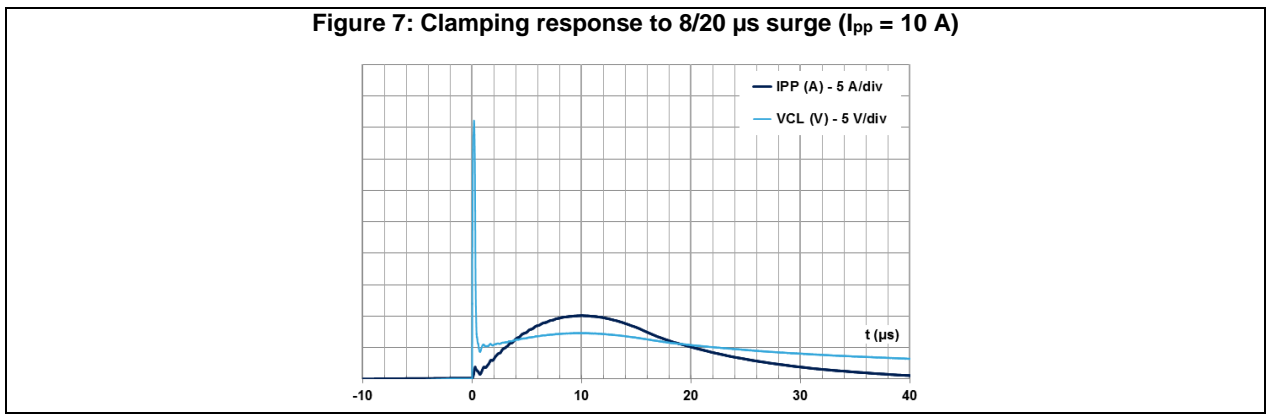
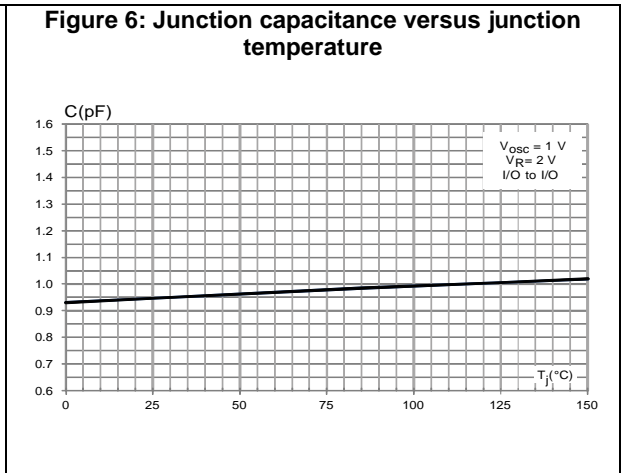
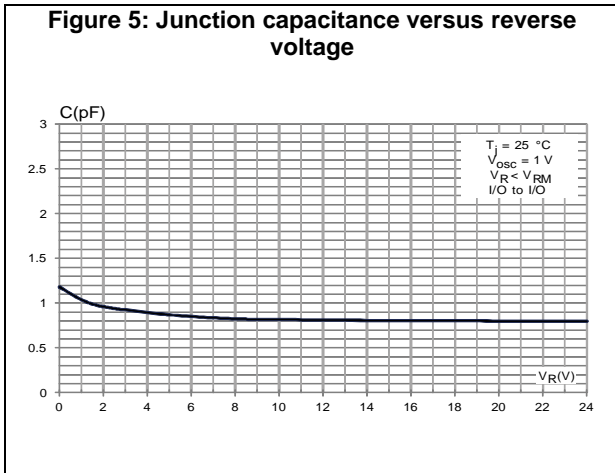
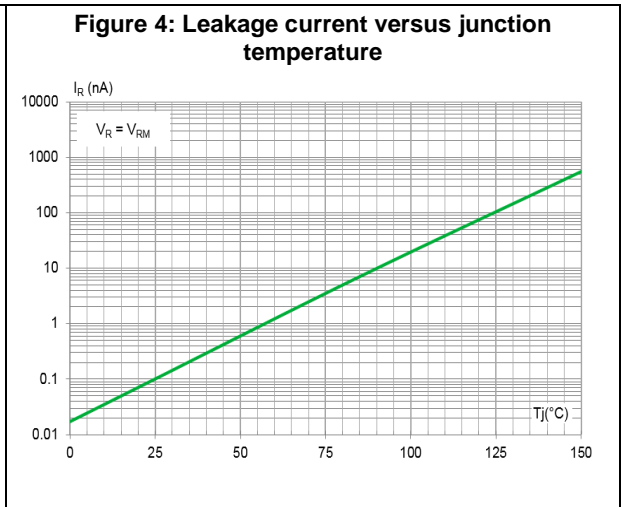
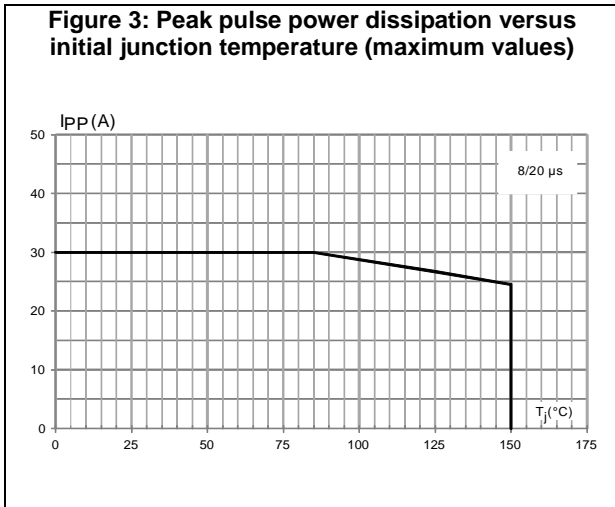
(1) Test conditions:  $V_R = 2$  V bias,  $V_{RMS} = 1$  V,  $f = 1$  MHz

(2) Measured between 1 V and  $V_{RM}$

**Figure 2: Electrical characteristics definitions**



### 1.1 Characteristics (curves)



## 2 Schematics

Figure 8: xDSL and G.FAST schematic for CPE applications

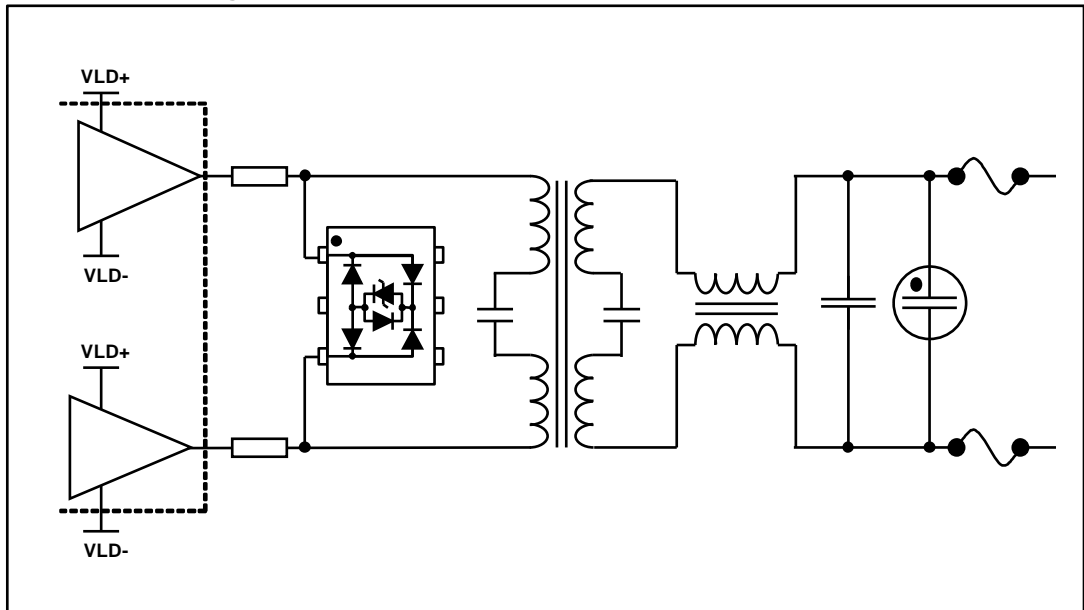
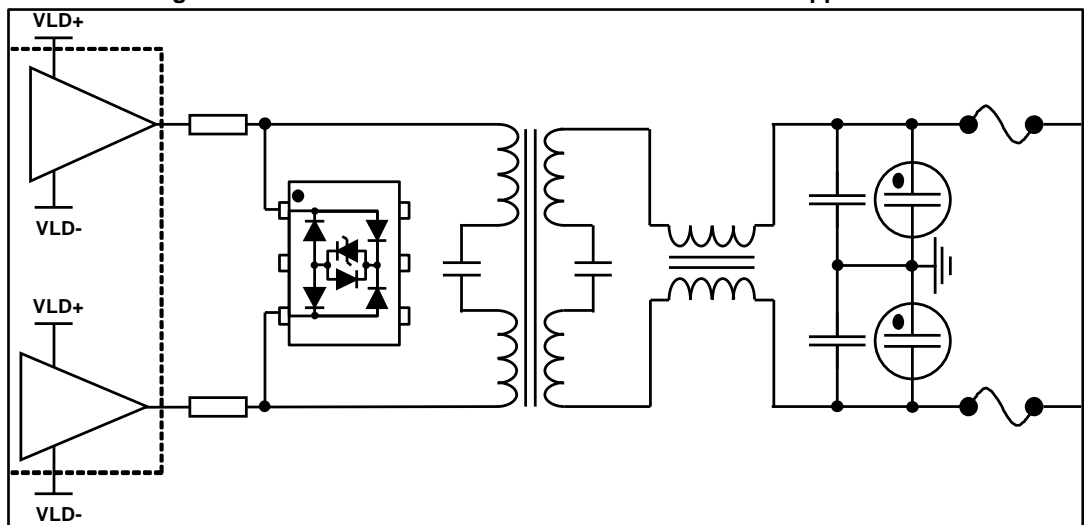


Figure 9: xDSL and G.FAST schematic for infrastructure applications



On topologies given in [Figure 8: "xDSL and G.FAST schematic for CPE applications"](#) and [Figure 9: "xDSL and G.FAST schematic for infrastructure applications"](#), +VLD and -VLD may not be connected.

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

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

#### 3.1 SOT23-6L package information

Figure 10: SOT23-6L package outline

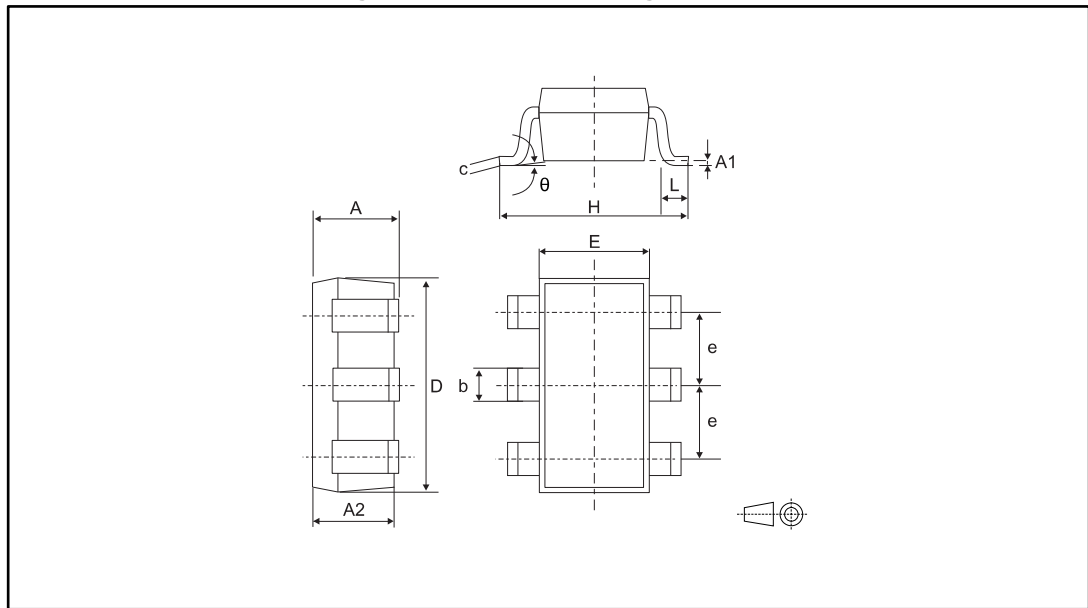
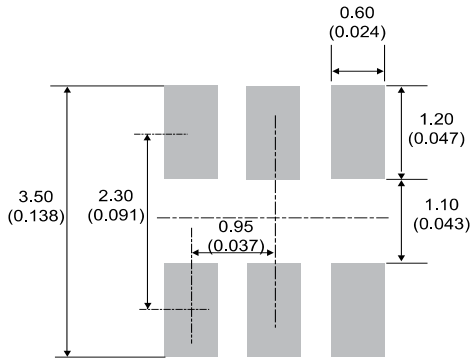


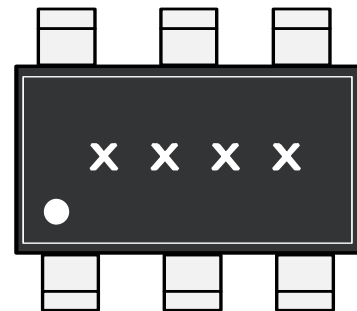
Table 4: SOT23-6L package mechanical data

| Ref. | Dimensions  |      |      |        |        |        |
|------|-------------|------|------|--------|--------|--------|
|      | Millimeters |      |      | Inches |        |        |
|      | Min.        | Typ. | Max. | Min.   | Typ.   | Max.   |
| A    | 0.9         |      | 1.45 | 0.0354 |        | 0.0571 |
| A1   | 0           |      | 0.15 | 0      |        | 0.0059 |
| A2   | 0.9         |      | 1.3  | 0.0354 |        | 0.0512 |
| b    | 0.30        |      | 0.5  | 0.0118 |        | 0.0197 |
| c    | 0.09        |      | 0.2  | 0.0035 |        | 0.0079 |
| D    | 2.8         |      | 3.05 | 0.1102 |        | 0.1201 |
| E    | 1.5         |      | 1.75 | 0.0591 |        | 0.0689 |
| e    |             | 0.95 |      |        | 0.0374 |        |
| H    | 2.6         |      | 3    | 0.1024 |        | 0.1181 |
| L    | 0.3         |      | 0.6  | 0.0118 |        | 0.0236 |
| θ    | 0           |      | 10   | 0      |        | 0.3937 |

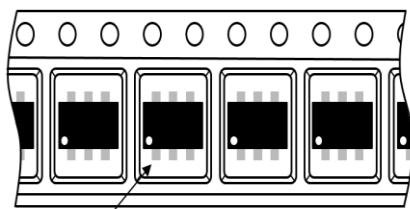
**Figure 11: Footprint recommendations, dimensions in mm (inches)**



**Figure 12: Marking layout (refer to ordering information table for marking)**



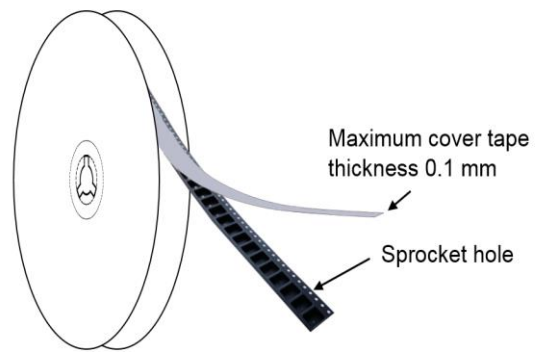
**Figure 13: Package orientation in reel**



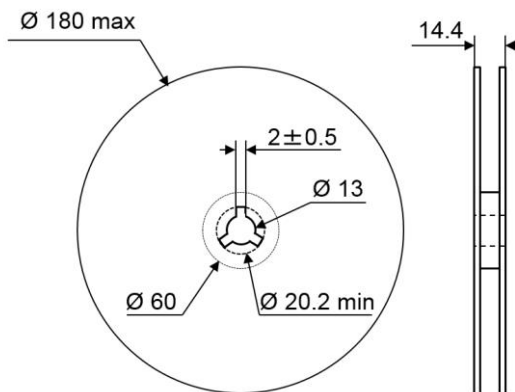
Pin 1 located according to EIA-481

Note: Pocket dimensions are not on scale  
Pocket shape may vary depending on package

**Figure 14: Tape and reel orientation**



**Figure 15: Reel dimensions (mm)**



**Figure 16: Inner box dimensions (mm)**

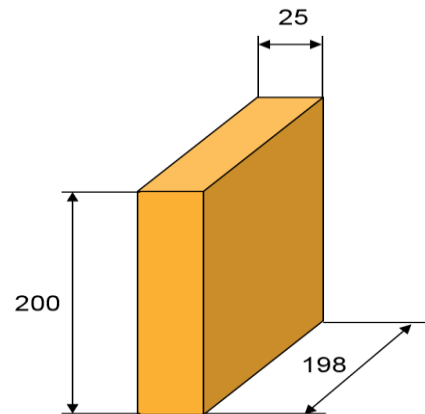


Figure 17: Tape and reel outline

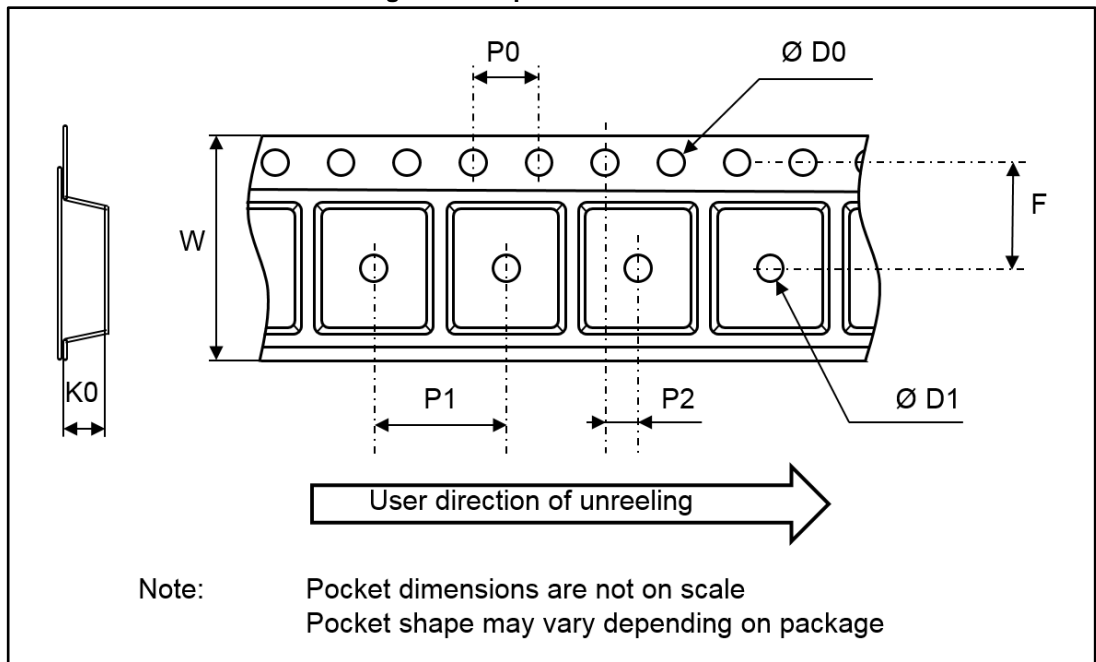
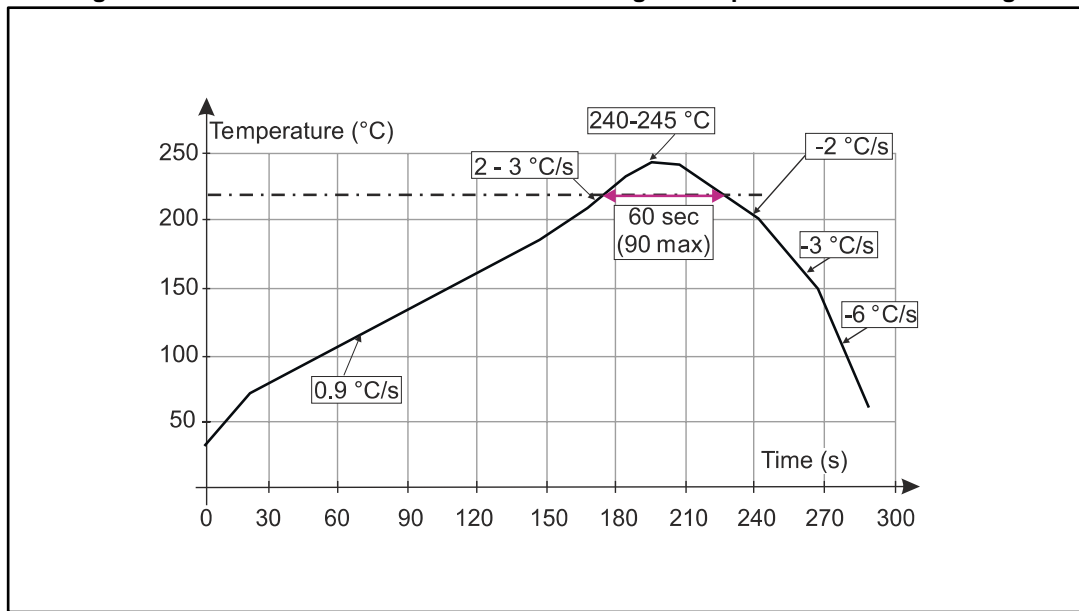


Table 5: Tape and reel mechanical data

| Ref. | Dimensions  |      |      |
|------|-------------|------|------|
|      | Millimeters |      |      |
|      | Min.        | Typ. | Max. |
| P1   | 3.9         | 4    | 4.1  |
| P0   | 3.9         | 4    | 4.1  |
| D0   | 1.45        | 1.5  | 1.6  |
| D1   | 1           |      |      |
| F    | 3.45        | 3.5  | 3.55 |
| K0   | 1.3         | 1.4  | 1.6  |
| P2   | 1.95        | 2    | 2.05 |
| W    | 7.9         | 8    | 8.3  |

Figure 18: 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 19: Ordering information scheme

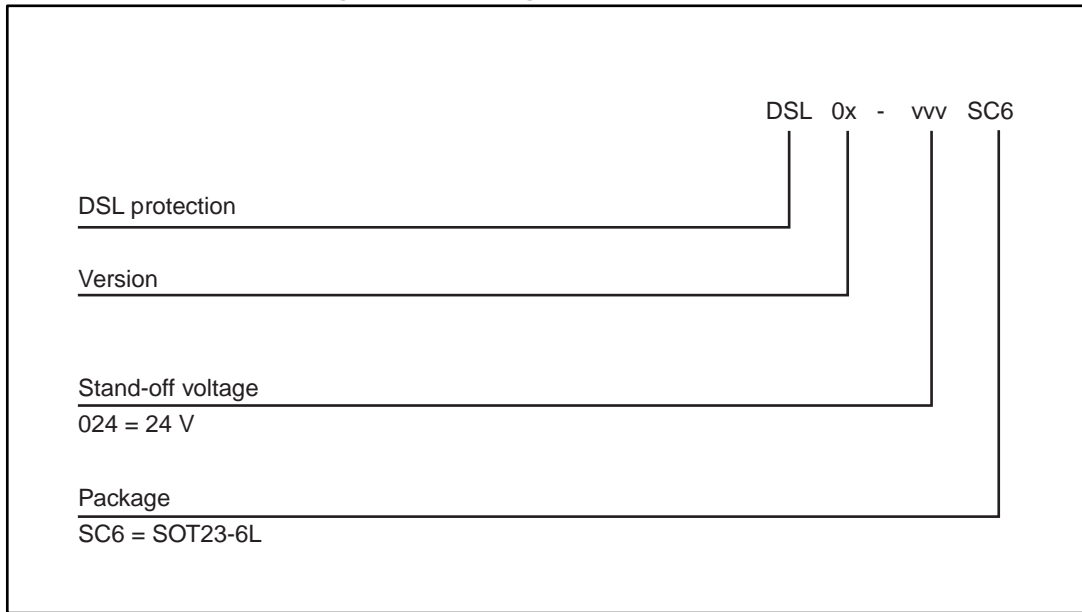


Table 6: Ordering information

| Order code   | Marking | Package  | Weight | Base qty. | Delivery mode |
|--------------|---------|----------|--------|-----------|---------------|
| DSL05-008SC6 | D508    | SOT23-6L | 14 g   | 3000      | Tape and reel |
| DSL05-012SC6 | D512    |          |        |           |               |
| DSL05-016SC6 | D516    |          |        |           |               |
| DSL05-024SC6 | D524    |          |        |           |               |

## 5 Revision history

Table 7: Document revision history

| Date        | Revision | Changes   |
|-------------|----------|---|
| 05-Jul-2016 | 1        | Initial release.  |
| 03-Oct-2016 | 2        | Updated Table 3: "Electrical characteristics (Tamb = 25 °C, pin 1 to pin 3)".   |
| 22-Aug-2017 | 3        | Added RPN DSL05-016SC6.<br>Updated <a href="#">Table 3: "Electrical characteristics (Tamb = 25 °C, pin 1 to pin 3)"</a> and <a href="#">Figure 4: "Leakage current versus junction temperature"</a> . |

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