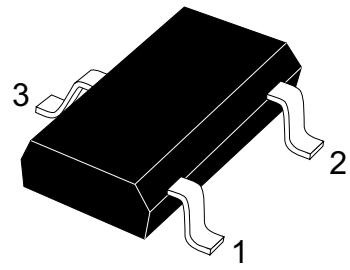
# ESDLIN03-1BWY

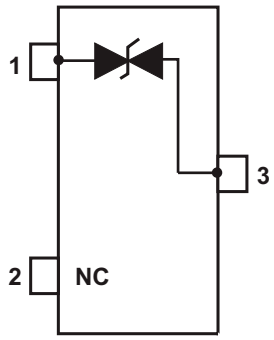
## Automotive single-line Transil™, transient voltage suppressor (TVS) for LIN bus

**Datasheet - production data**




SOT323-3L

**Figure 1. Functional schematic**




**Top view**

### Complies with the following standards

- ISO 10605 - C = 150 pF, R = 330 Ω :
  - ±30 kV (air discharge)
  - ±30 kV (contact discharge)
- ISO 10605 - C = 330 pF, R = 330 Ω :
  - ±30 kV (air discharge)
  - ±30 kV (contact discharge)
- ISO 7637-3:
  - Pulse 3a: $V_s$ = -150 V
  - Pulse 3b: $V_s$ = +100 V

## Application

LIN bus lines where electrostatic discharge and other transients must be suppressed. This product is compliant with most of automotive interfaces.

## Description

The ESDLIN03-1BWY is a single-line Transil specifically designed for the protection of the automotive LIN bus lines against electrostatic discharge (ESD) and transient voltages.

## Features

- Single-line ESD and EOS protection
- Stand-off voltage: 26.5 V
- Bidirectional device
- Max pulse power: 250 W (8/20 µs)
- Low clamping factor $V_{CL}$ / $V_{BR}$
- Low leakage current
- ECOPACK®2 compliant component
- AEC-Q101 qualified

TM: Transil is a trademark of STMicroelectronics

# 1 Characteristics

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

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{PP}$ | Electrostatic discharge capability | ISO 10605 - C = 150 pF, R = 330 Ω :<br>Contact discharge<br>Air discharge | <br>30<br>30 | kV |
| | | ISO 10605 - C = 330 pF, R = 330 Ω :<br>Contact discharge<br>Air discharge | <br>30<br>30 | |
| | | HBM MIL STD 883 | 30 | |
| $P_{PP}$ | Peak pulse power dissipation (8/20 µs) | $T_j$ initial = $T_{amb}$ | 250 | W |
| $I_{PP}$ | Peak pulse current (8/20 µs) | | 3.7 | A |
| $T_j$ | Operating junction temperature range | | -55 to +175 | °C |
| $T_{stg}$ | Storage temperature range | | -55 to +175 | °C |

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

| Symbol | | Parameter |
|---|---|---|
| $V_{BR}$ | = | Breakdown voltage |
| $V_{RM}$ | = | Stand-of voltage |
| $V_{CL}$ | = | Clamping voltage |
| $I_{RM}$ | = | Leakage current at $V_{RM}$ |
| $I_{PP}$ | = | Peak pulse current |
| $R_d$ | = | Dynamic impedance |

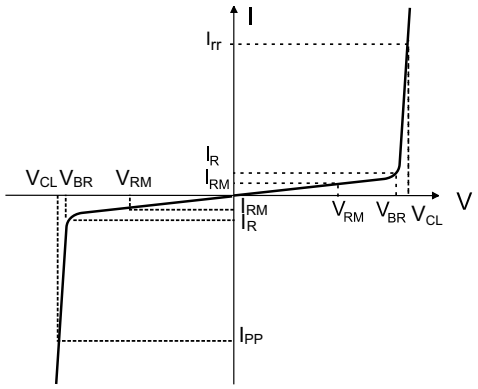


**Table 2. Electrical characteristics (values, $T_{amb}$ = 25 °C)**

| Symbol | Test conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{RM}$ | ESDLIN03-1BWY | | | | 26.5 | V |
| $V_{BR}$ | $I_R$ = 1 mA | | 28.5 | | | V |
| $I_{RM}$ | $V_{RM}$ = 24 V | $T_j$ = 25 °C | | | 10 | nA |
| | $V_{RM}$ = 5V | | | | 1 | |
| | $V_{RM}$ = 24 V | $T_j$ = 125 °C | | | 50 | |
| | $V_{RM}$ = 5V | | | | 10 | |
| $V_{CL}$ | ISO 7637-3 Pulse 3a ($U_s$ = -150 V) | | -39 | | | V |
| | ISO 7637-3 Pulse 3b ($U_s$ = +100 V) | | | | 39 | |
| | IEC 61000-4-5 (8/20 µs), $I_{PP}$ = 1 A | | | | 37 | |
| | IEC 61000-4-5 (8/20 µs), $I_{PP}$ = 3A | | | | 44 | |
| C | $V_R$ = 0 V DC, f = 1 MHz | | | 3 | 3.5 | pF |
| $\alpha T^{(1)}$ | Voltage temperature coefficient | | | | 9 | $10^{-4}$/°C |

1. $V_{BR}$ at $T_j$ = $V_{BR}$ at 25°C x (1 + αT x ($T_j$ – 25))

**Figure 3. Peak pulse current versus initial junction temperature (maximum values)**

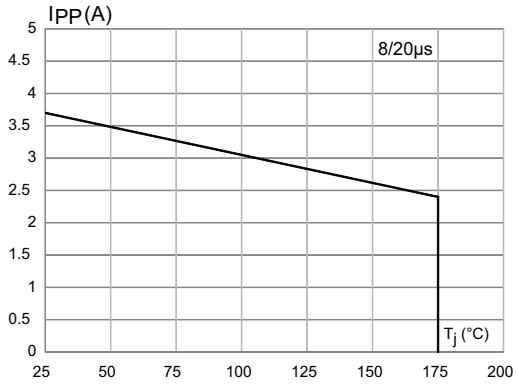



**Figure 4. Junction capacitance versus reverse voltage applied**

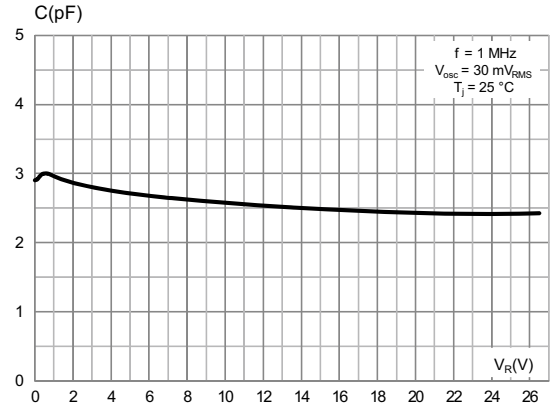


**Figure 5. Peak pulse current versus clamping voltage**

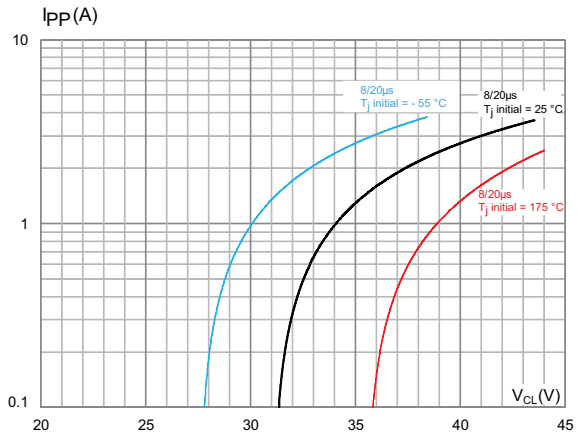



**Figure 6. Leakage current versus junction temperature**

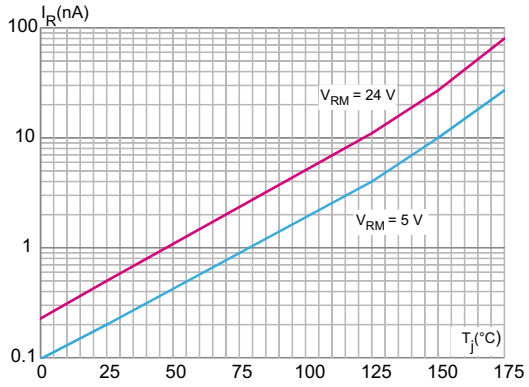



**Figure 7. S21 attenuation measurement**

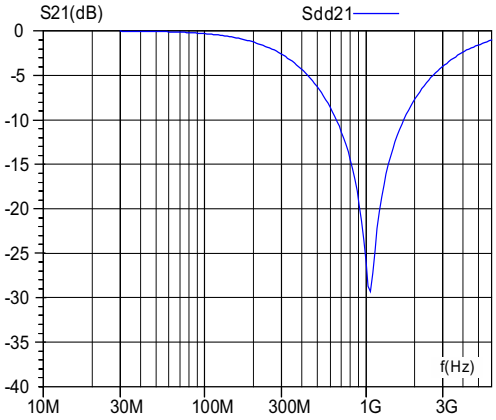



**Figure 8. ESD response to ISO 10605 - C = 150 pF, R = 330 Ω (+8 kV contact)**

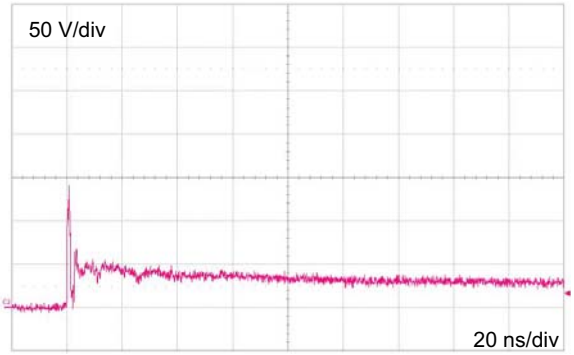



**Figure 9. ESD response to ISO 10605 - C = 150 pF, R = 330 Ω (-8 kV contact)**

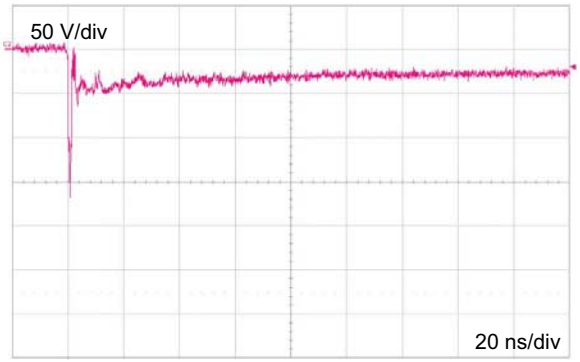



**Figure 10. Response to ISO 7637-3 Pulse 3a (Us = -150 V)**

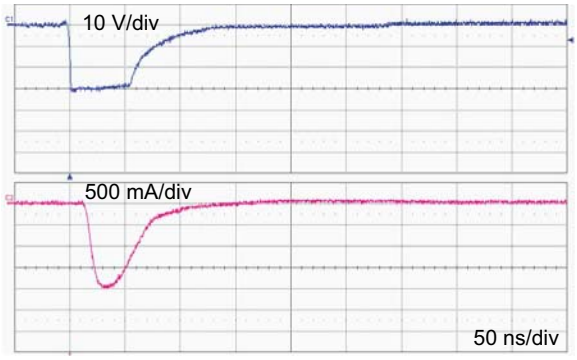


**Figure 11. Response to ISO 7637-3 Pulse 3b (Us = +100 V)**

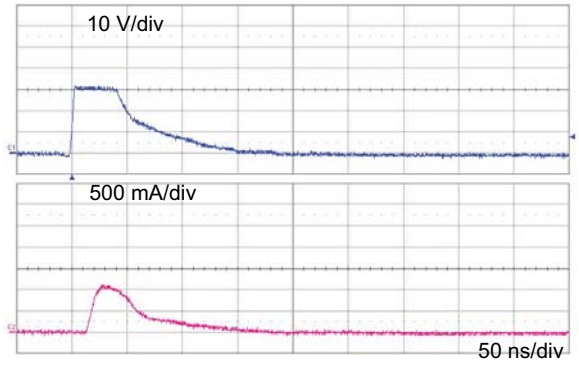
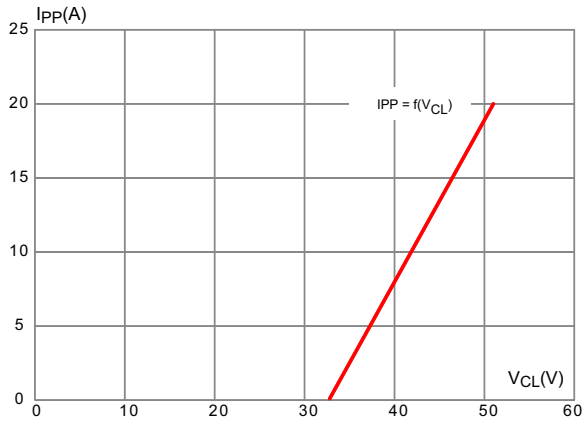



**Figure 12. TLP measurements**



# 2 Package information

- Epoxy meets UL94, V0
- Lead-free packages

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.

## 2.1 SOT323-3L package information

**Figure 13. SOT323-3L package outline**

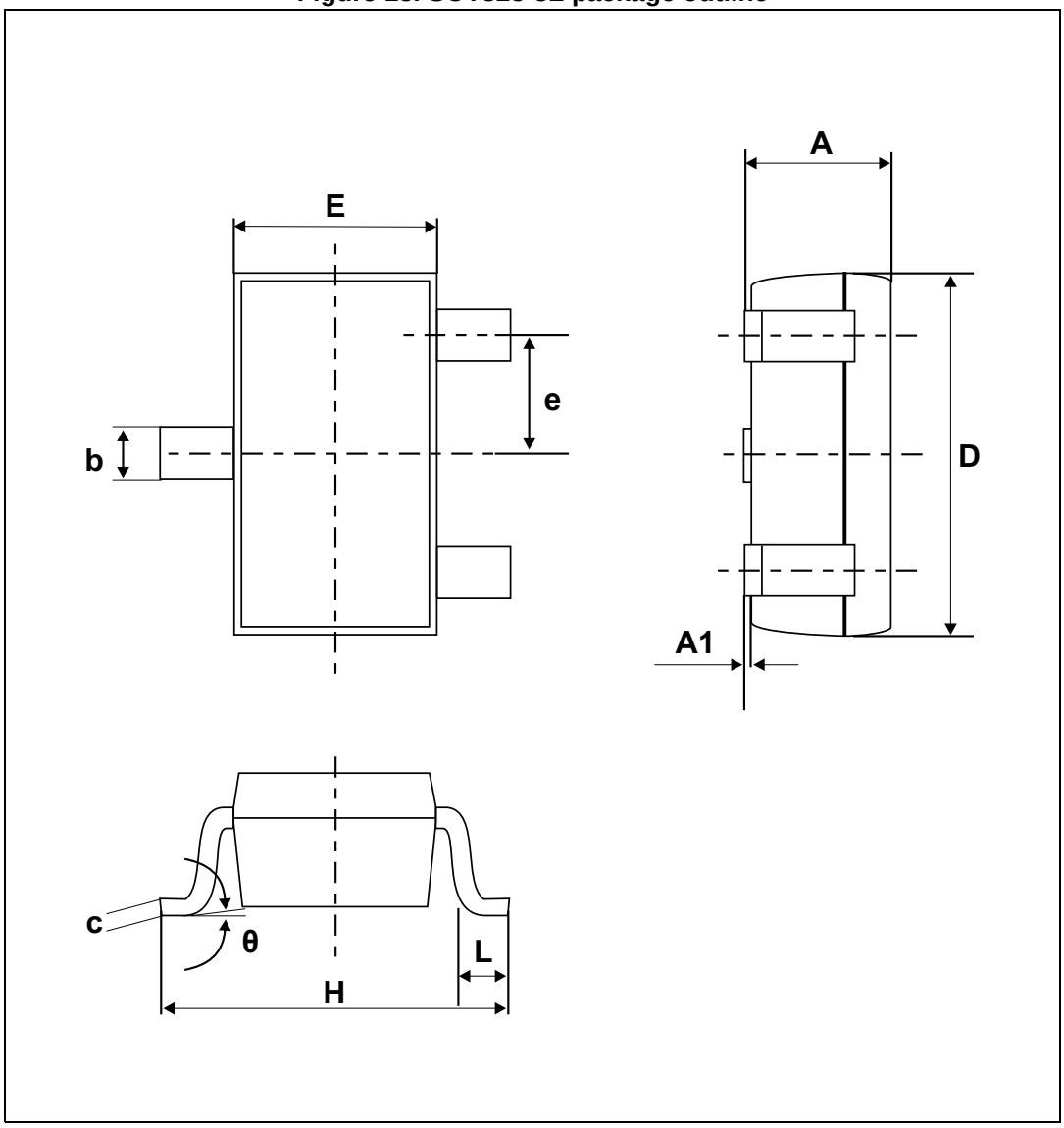
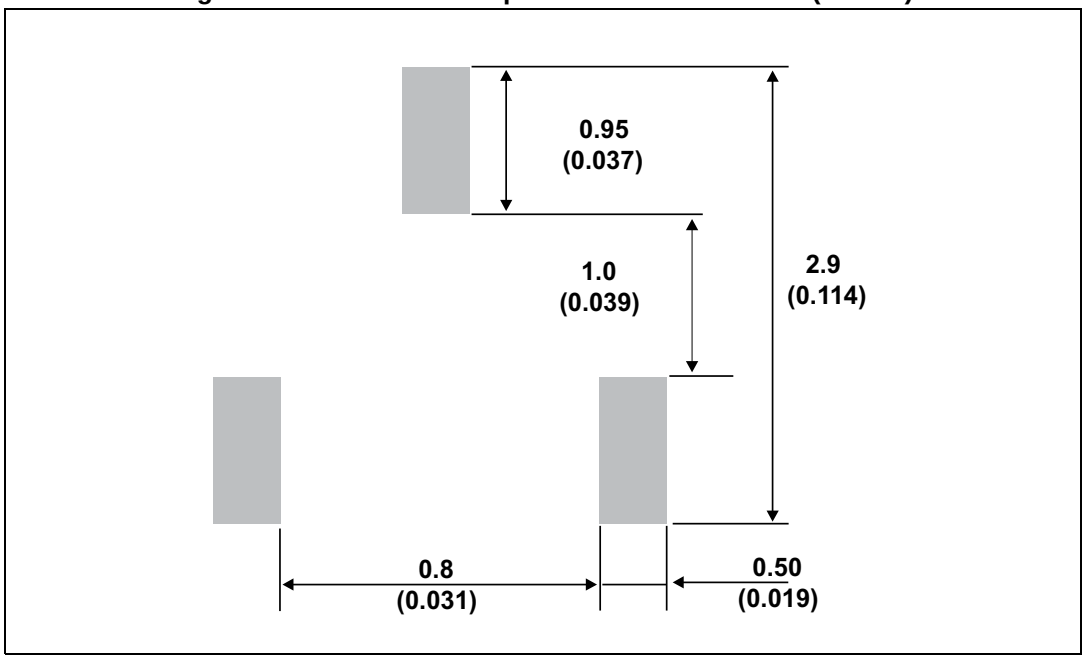


**Table 3. SOT323-3L package mechanical data**

| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches[1] | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.8 | | 1.1 | 0.031 | | 0.043 |
| A1 | 0.0 | | 0.1 | 0.0 | | 0.004 |
| b | 0.25 | | 0.4 | 0.01 | | 0.016 |
| c | 0.1 | | 0.26 | 0.004 | | 0.01 |
| D | 1.8 | 2.0 | 2.2 | 0.071 | 0.079 | 0.086 |
| E | 1.15 | 1.25 | 1.35 | 0.045 | 0.049 | 0.053 |
| e | | 0.65 | | | 0.026 | |
| H | 1.8 | 2.1 | 2.4 | 0.071 | 0.083 | 0.094 |
| L | 0.1 | 0.2 | 0.3 | 0.004 | 0.008 | 0.012 |
| Θ | 0 | | 30° | 0 | | 30° |

1. Values in inches are converted from mm and rounded to 4 decimal digits.

**Figure 14. SOT323-3L footprint dimensions in mm (inches)**

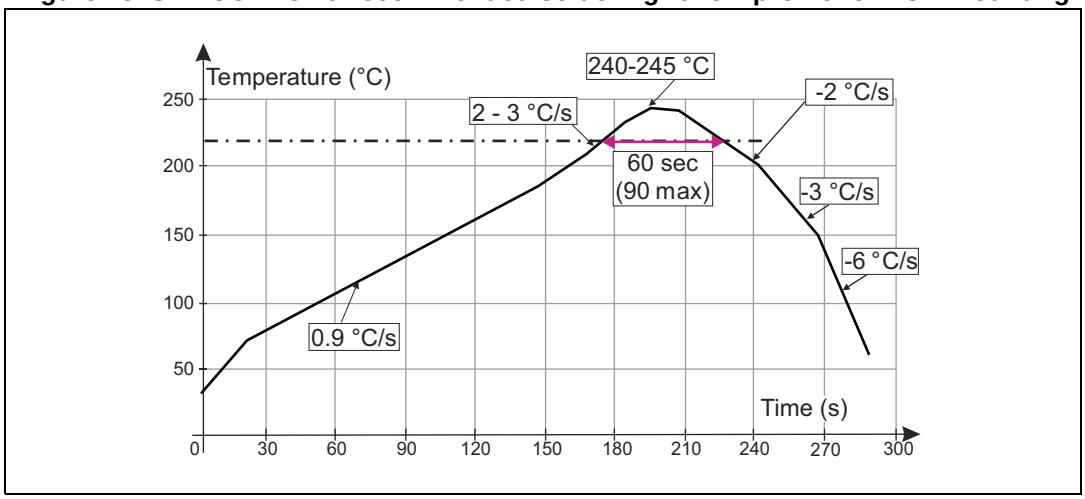


## 2.2 PCB design preference

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.

## 2.3 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.*

# 3 Ordering information

**Figure 16. Ordering information scheme**

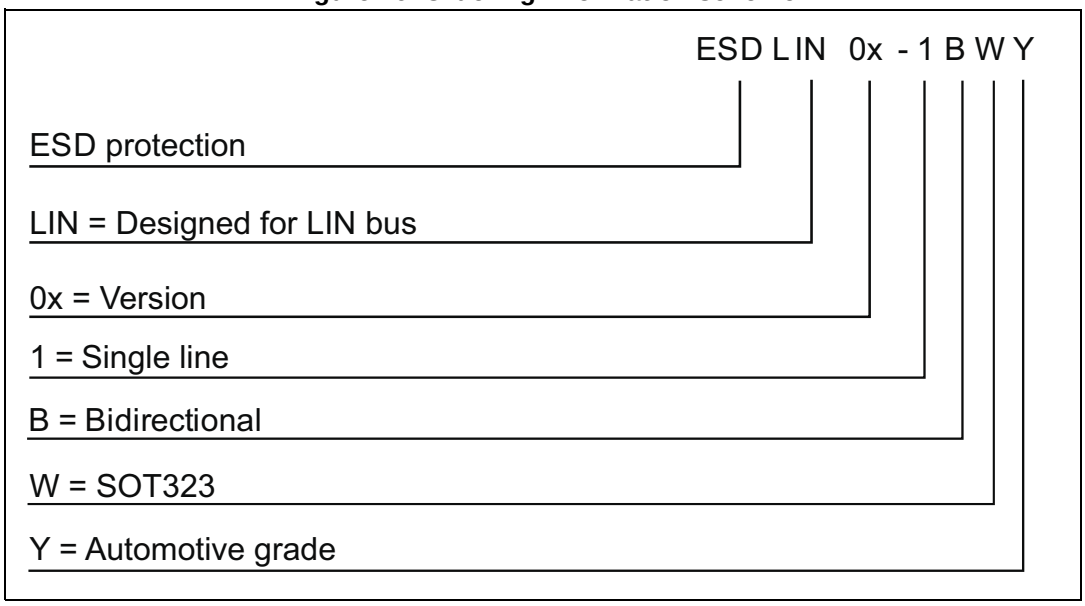



**Table 4. Ordering information**

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| ESDLIN03-1BWY | C12 | SOT-323-3L | 6.58 mg | 3000 | Tape and reel |

# 4 Revision history

**Table 5. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 05-Jan-2016 | 1 | Initial release. |