



PESD5V0X1UAB

Ultra low capacitance unidirectional ESD protection diode

6 April 2021

Product data sheet

1. General description

Ultra low capacitance unidirectional ElectroStatic Discharge (ESD) protection diode in a SOD523 (SC-79) ultra small and flat lead Surface-Mounted Device (SMD) plastic package designed to protect one signal line from the damage caused by ESD and other transients.

The combination of extremely low capacitance and ultra low clamping voltage makes the device ideal for high-speed data line protection applications.

2. Features and benefits

- ESD protection of one line
- ESD protection up to 15 kV
- Ultra low diode capacitance $C_d = 1.55$ pF
- IEC 61000-4-2; level 4 (ESD)
- Ultra low clamping voltage: $V_{CL} = 9$ V
- IEC 61000-4-5 (surge); $I_{PP} = 2$ A
- Ultra low leakage current: $I_{RM} = 1$ nA
- AEC-Q101 qualified

3. Applications

- Computers and peripherals
- Portable electronics
- Audio and video equipment
- SIM card protection
- Cellular handsets and accessories
- USB, HDMI, FireWire
- 10/100/1000 Mbit/s Ethernet
- High-speed data lines
- Communication systems


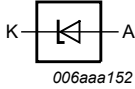
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|--------------------------|---|-----|------|------|------|
| V_{RWM} | reverse standoff voltage | $T_{amb} = 25$ °C | - | - | 5.5 | V |
| C_d | diode capacitance | $f = 1$ MHz; $V_R = 0$ V; $T_{amb} = 25$ °C | - | 1.55 | 1.75 | pF |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|------------------------|---|---|
| 1 | K | cathode ^[1] |  <p>SC-79 (SOD523)</p> |  |
| 2 | A | anode | | |

[1] The marking bar indicates pin 1.

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|--------------|---------|--|---------|
| | Name | Description | Version |
| PESD5V0X1UAB | SC-79 | plastic, surface-mounted package; 2 leads; 1.2 mm x 0.8 mm x 0.6 mm body | SOD523 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|--------------|--------------|
| PESD5V0X1UAB | Y2 |

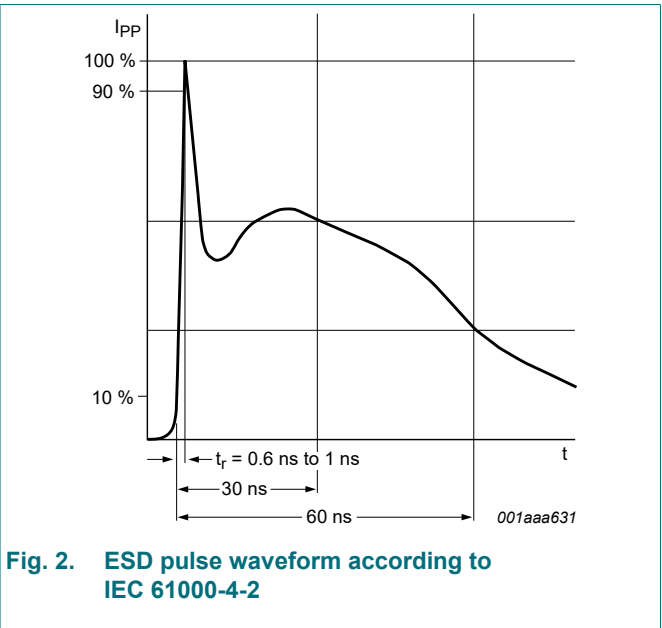
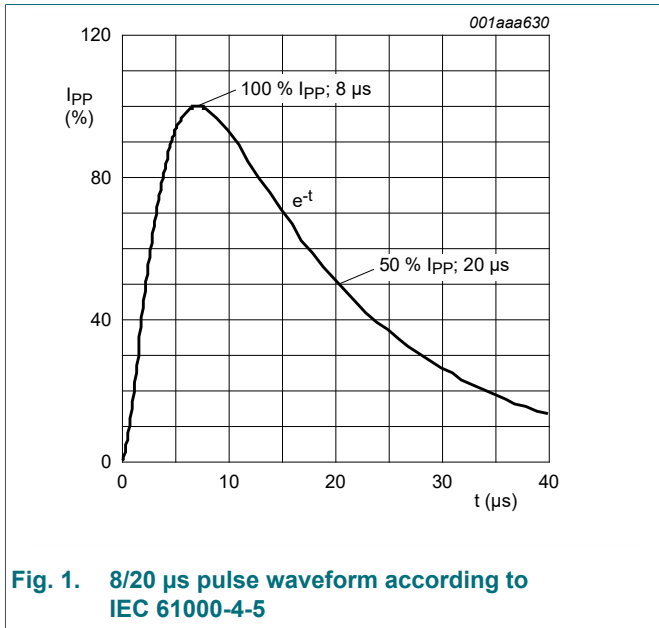
8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|----------------------------|---------------------------------|-----------------------------------|---------|-----|------|------|
| I_{PPM} | rated peak pulse current | $t_p = 8/20 \mu s$ | [1] [2] | - | 2 | A |
| T_j | junction temperature | | | - | 150 | °C |
| T_{amb} | ambient temperature | | | -55 | 150 | °C |
| T_{stg} | storage temperature | | | -65 | 150 | °C |
| ESD maximum ratings | | | | | | |
| V_{ESD} | electrostatic discharge voltage | IEC 61000-4-2 (contact discharge) | [3] [2] | - | 15 | kV |
| | | machine model | | - | 2000 | V |
| | | HBM MIL-STD883 | [2] | - | 10 | kV |

- [1] Non-repetitive current pulse 8/20 μs exponentially decay waveform according to IEC 61000-4-5.
- [2] Measured from pin 1 to pin 2.
- [3] Device stressed with ten non-repetitive ESD pulses.



9. Characteristics

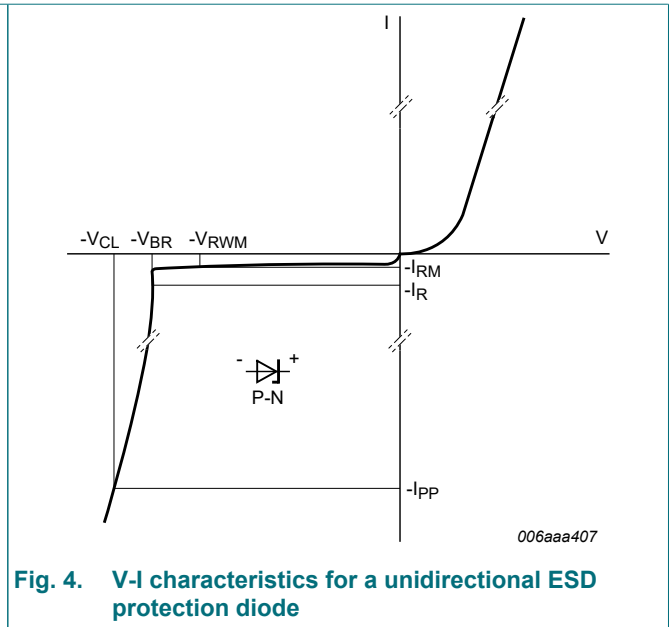
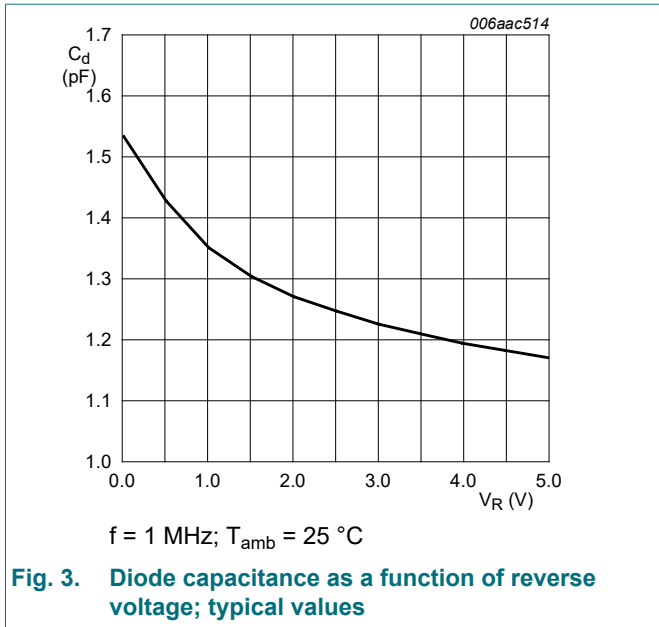
Table 6. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|--------------------------|--|---------|------|------|----------|
| V_{RWM} | reverse standoff voltage | $T_{amb} = 25\text{ °C}$ | - | - | 5.5 | V |
| V_{BR} | breakdown voltage | $I_R = 10\text{ mA}; T_{amb} = 25\text{ °C}$ | 5.8 | 7.5 | 10 | V |
| I_{RM} | reverse leakage current | $V_{RWM} = 5\text{ V}; T_{amb} = 25\text{ °C}$ | - | 1 | 100 | nA |
| C_d | diode capacitance | $f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ °C}$ | - | 1.55 | 1.75 | pF |
| V_{CL} | clamping voltage | $I_{PPM} = 2\text{ A}; T_{amb} = 25\text{ °C}$ | [1] [2] | 9 | - | V |
| R_{dyn} | dynamic resistance | $I_R = 10\text{ A}; T_{amb} = 25\text{ °C}$ | [3] | 0.15 | - | Ω |

[1] Non-repetitive current pulse 8/20 μs exponentially decay waveform according to IEC 61000-4-5.

[2] Measured from pin 1 to 2.

[3] Non-repetitive current pulse, Transmission Line Pulse (TLP) $t_p = 100\text{ ns}$; square pulse; ANSI / ESD STM5.5.1-2008.



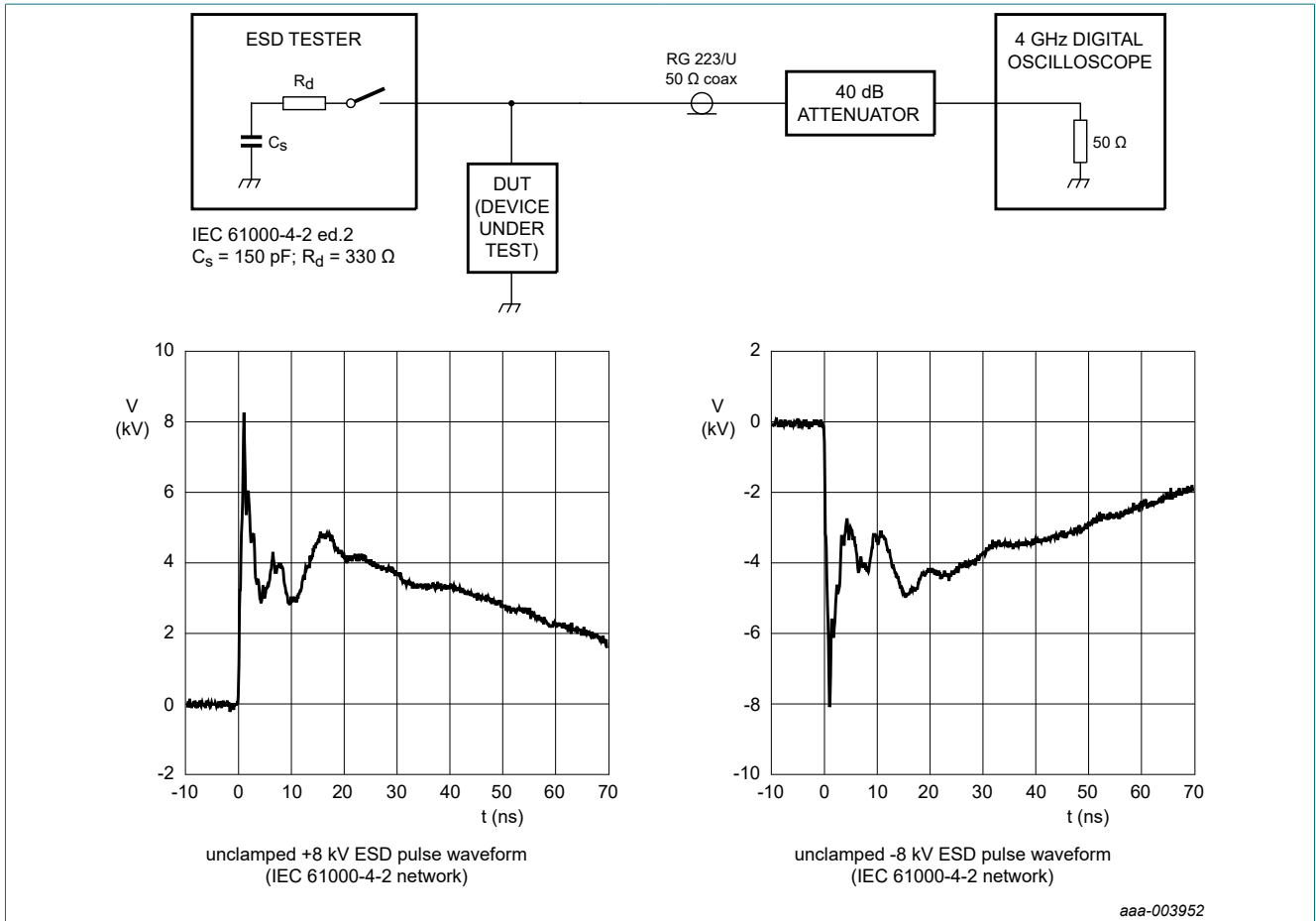
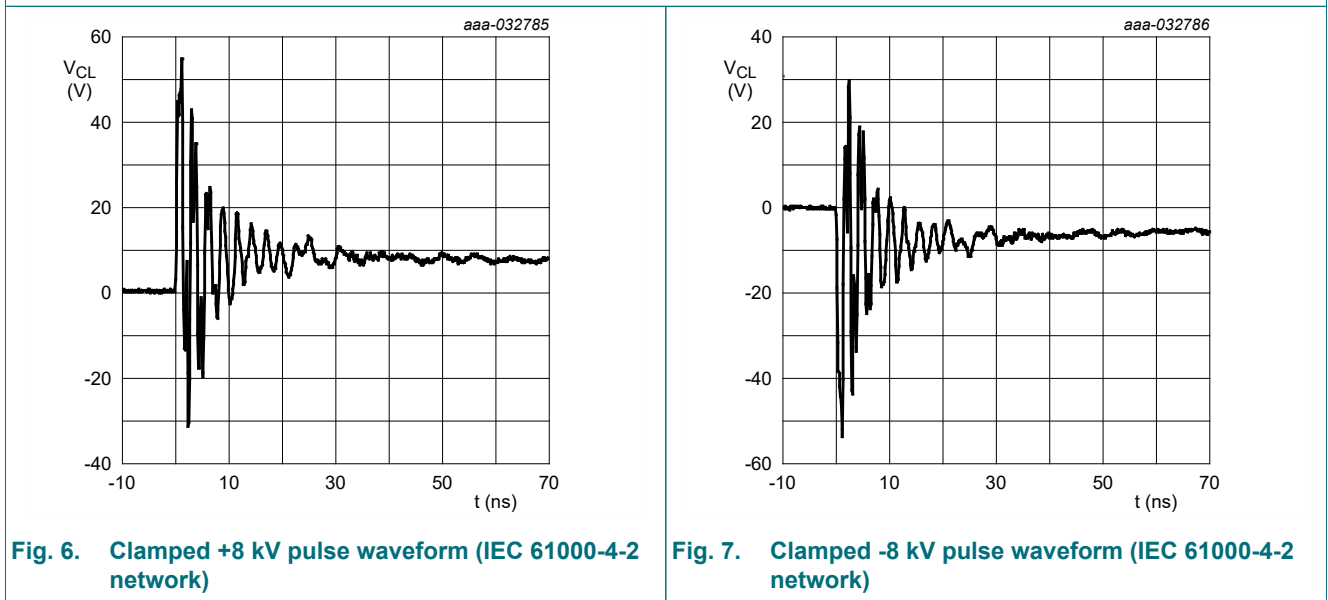


Fig. 5. ESD clamping test setup and waveforms



10. Application information

The device is designed for protection of one unidirectional data or signal line from surge pulses and ESD damage. The device is suitable on lines where the signal polarities are either positive or negative with respect to ground.

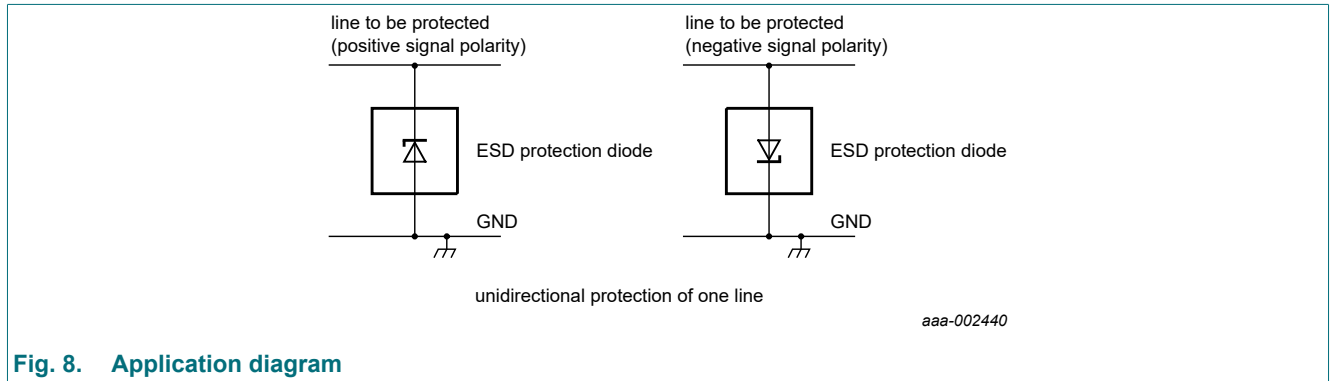


Fig. 8. Application diagram

Circuit board layout and protection device placement

Circuit board layout is critical for the suppression of ESD, Electrical Fast Transient (EFT) and surge transients. The following guidelines are recommended:

1. Place the device as close to the input terminal or connector as possible.
2. Minimize the path length between the device and the protected line.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit Board (PCB) conductive loops including power and ground loops.
6. Minimize the length of the transient return path to ground.
7. Avoid using shared transient return paths to a common ground point.
8. Use ground planes whenever possible. For multilayer PCBs, use ground vias.

11. Test information

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline

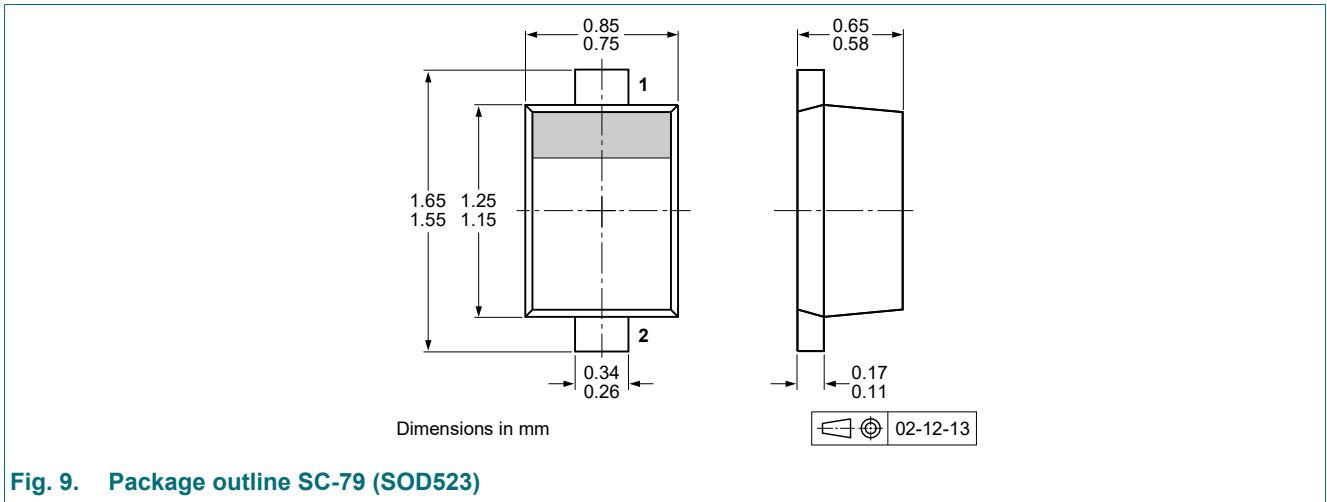


Fig. 9. Package outline SC-79 (SOD523)

13. Soldering

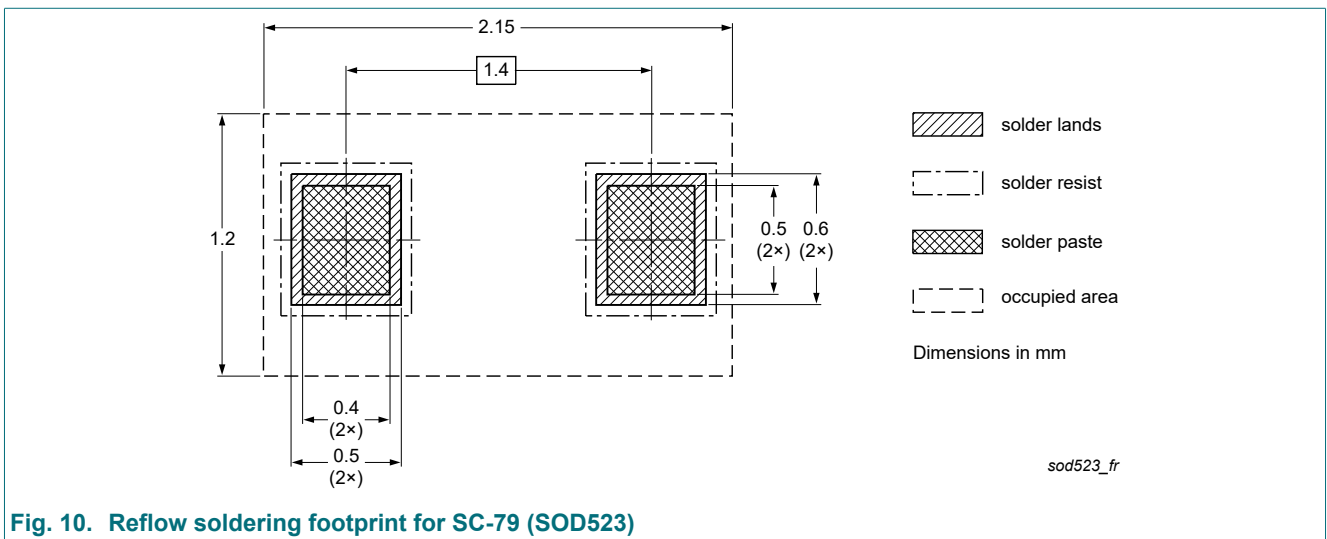


Fig. 10. Reflow soldering footprint for SC-79 (SOD523)

14. Revision history

Table 7. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------|--|--------------------|---------------|------------------|
| PESD5V0X1UAB v.2 | 20210406 | Product data sheet | - | PESD5V0X1UAB v.1 |
| Modifications: | <ul style="list-style-type: none">• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.• Legal texts have been adapted to the new company name where appropriate.• Section "Packing" removed• Figure "ESD clamping test setup and waveforms" updated.• Figure "Reflow soldering footprint for SOD523" updated. | | | |
| PESD5V0X1UAB v.1 | 20110215 | Product data sheet | - | - |

15. Legal information

Data sheet status

| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 6 April 2021
