



BAT54S

Schottky barrier diodes

1 July 2022

Product data sheet

1. General description

Planar Schottky barrier diodes with an integrated guard ring for stress protection, encapsulated in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Low forward voltage
- Low capacitance

3. Applications

- Ultra high-speed switching
- Line termination
- Voltage clamping
- Reverse polarity protection

4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------|-----------------|---|-----|-----|-----|---------------|
| V_R | reverse voltage | | - | - | 30 | V |
| V_F | forward voltage | $I_F = 100 \text{ mA}$; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 800 | mV |
| I_R | reverse current | $V_R = 25 \text{ V}$; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 2 | μA |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|--------------------|--------------------|------------------|
| 1 | A1 | anode (diode 1) | <p>SOT23</p> | <p>006aaa437</p> |
| 2 | K2 | cathode (diode 2) | | |
| 3 | K1; A2 | cathode 1; anode 2 | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| BAT54S | SOT23 | plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body | SOT23 |

7. Marking

Table 4. Marking codes

| Type number | Marking code[1] |
|-------------|-----------------|
| BAT54S | %V4 |

[1] % = placeholder for manufacturing site code

8. Limiting values

Table 5. Limiting values

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

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|-------------------------------------|-------------------------------------|--|-----|-----|-----|------|
| V_R | reverse voltage | | | - | 30 | V |
| I_F | forward current | $T_{amb} = 25\text{ °C}$ | | - | 200 | mA |
| I_{FRM} | repetitive peak forward current | $t_p \leq 1\text{ s}$; $\delta \leq 0.5$; $T_{amb} = 25\text{ °C}$ | | - | 300 | mA |
| I_{FSM} | non-repetitive peak forward current | $t_p < 10\text{ ms}$; $T_{j(init)} = 25\text{ °C}$ | | - | 600 | mA |
| Per device; one diode loaded | | | | | | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [1] | - | 250 | mW |
| T_j | junction temperature | | | - | 150 | °C |
| T_{amb} | ambient temperature | | | -55 | 150 | °C |
| T_{stg} | storage temperature | | | -65 | 150 | °C |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---------------|---|-------------|---------|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] [2] | - | - | 500 | K/W |

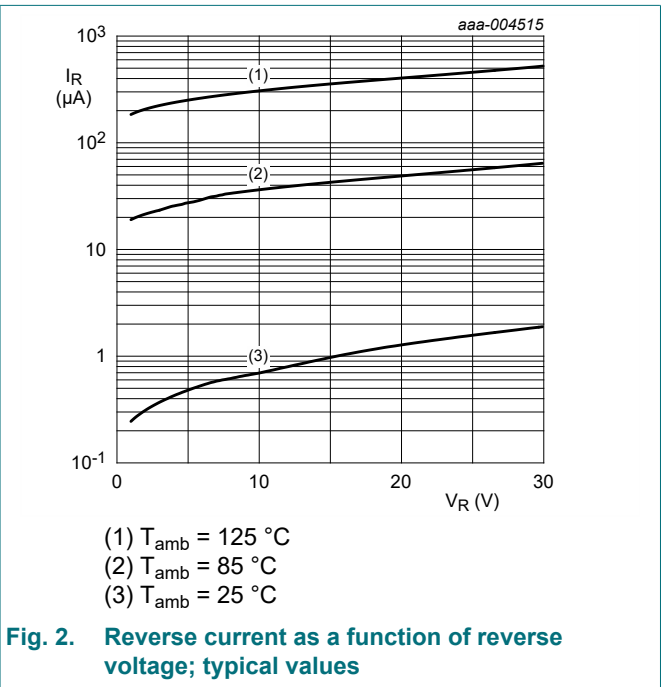
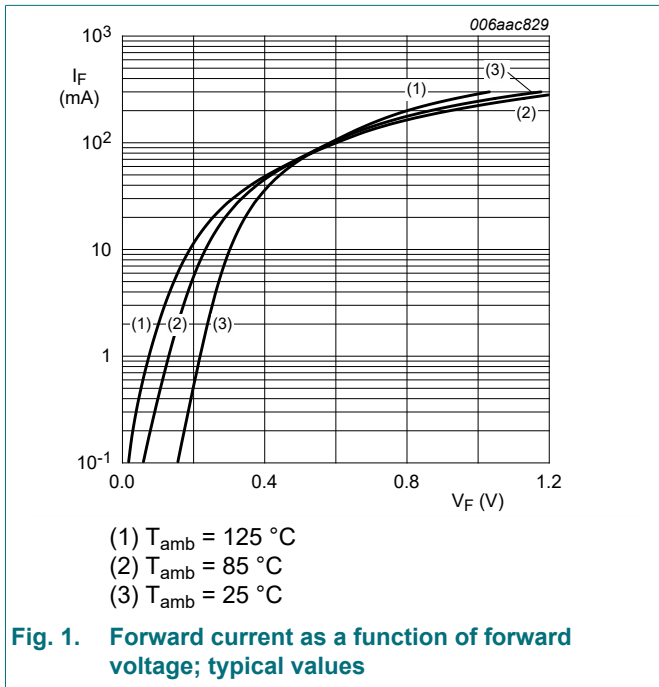
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses PR are a significant part of the total power losses.

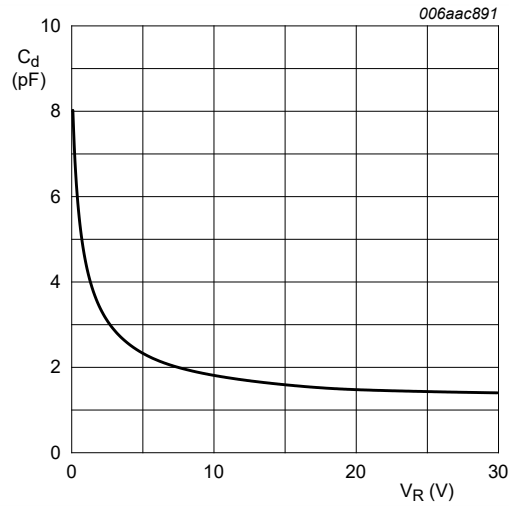
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------|-----------------------|---|-----|-----|-----|---------------|
| V_F | forward voltage | $I_F = 0.1 \text{ mA}$; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 240 | mV |
| | | $I_F = 1 \text{ mA}$; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 320 | mV |
| | | $I_F = 10 \text{ mA}$; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 400 | mV |
| | | $I_F = 30 \text{ mA}$; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 500 | mV |
| | | $I_F = 100 \text{ mA}$; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 800 | mV |
| I_R | reverse current | $V_R = 25 \text{ V}$; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 2 | μA |
| C_d | diode capacitance | $V_R = 1 \text{ V}$; $f = 1 \text{ MHz}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 10 | pF |
| t_{rr} | reverse recovery time | $I_F = 10 \text{ mA}$; $I_R = 10 \text{ mA}$; $I_{R(\text{meas})} = 1 \text{ mA}$; $R_L = 100 \Omega$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 5 | ns |

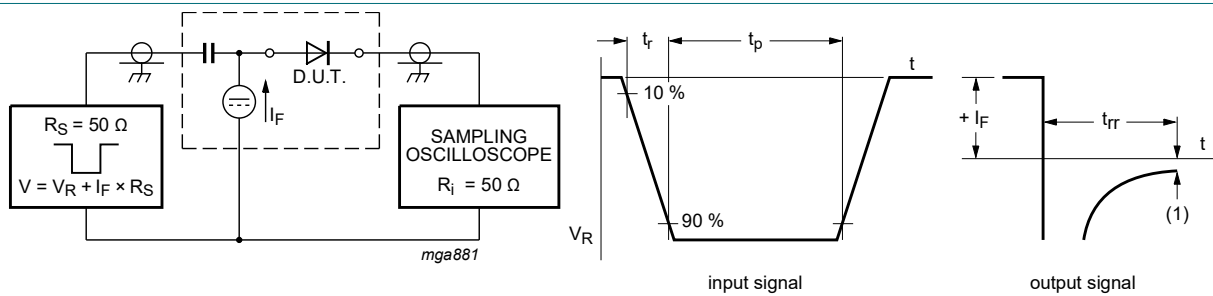




$T_{amb} = 25\text{ }^\circ\text{C}; f = 1\text{ MHz}$

Fig. 3. Diode capacitance as a function of reverse voltage; typical values

11. Test information



(1) $I_R = 1\text{ mA}$

Fig. 4. Reverse recovery time test circuit and waveforms

12. Package outline

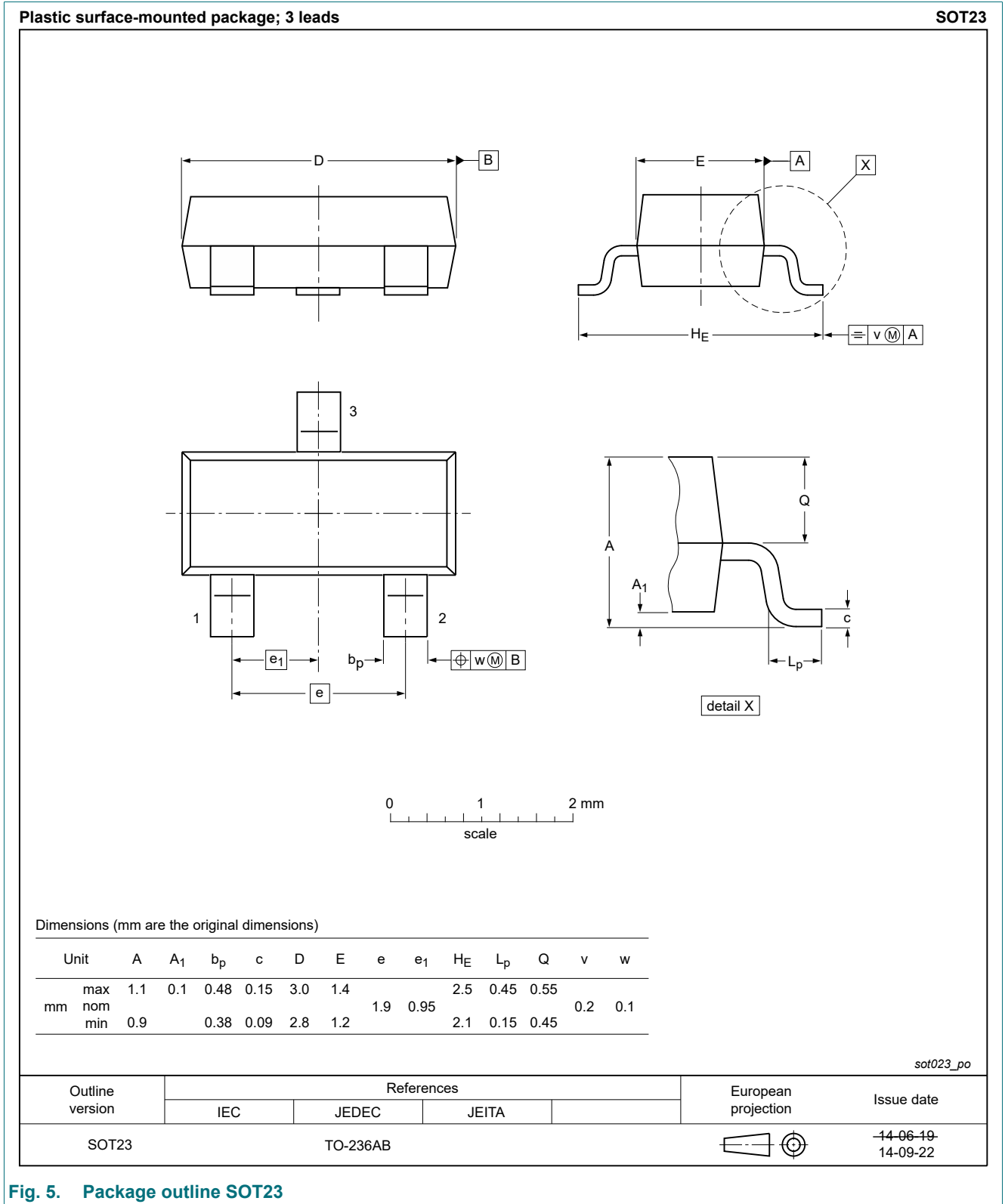


Fig. 5. Package outline SOT23

13. Soldering

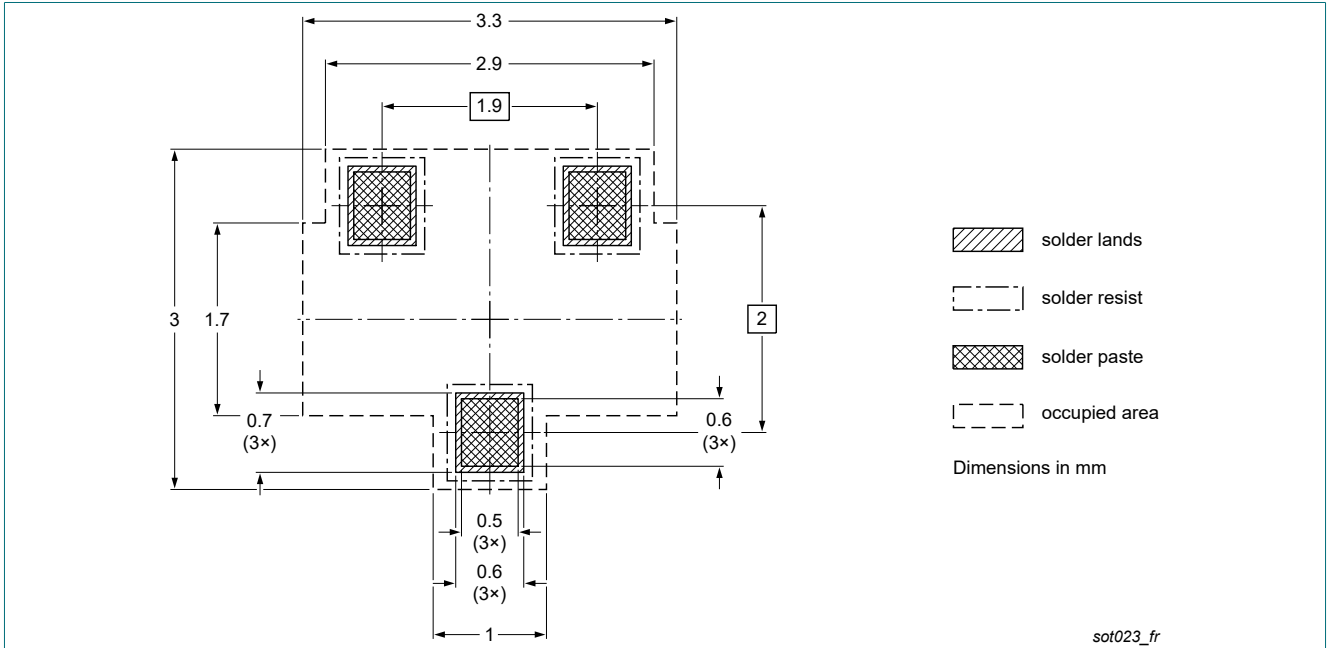


Fig. 6. Reflow soldering footprint for SOT23

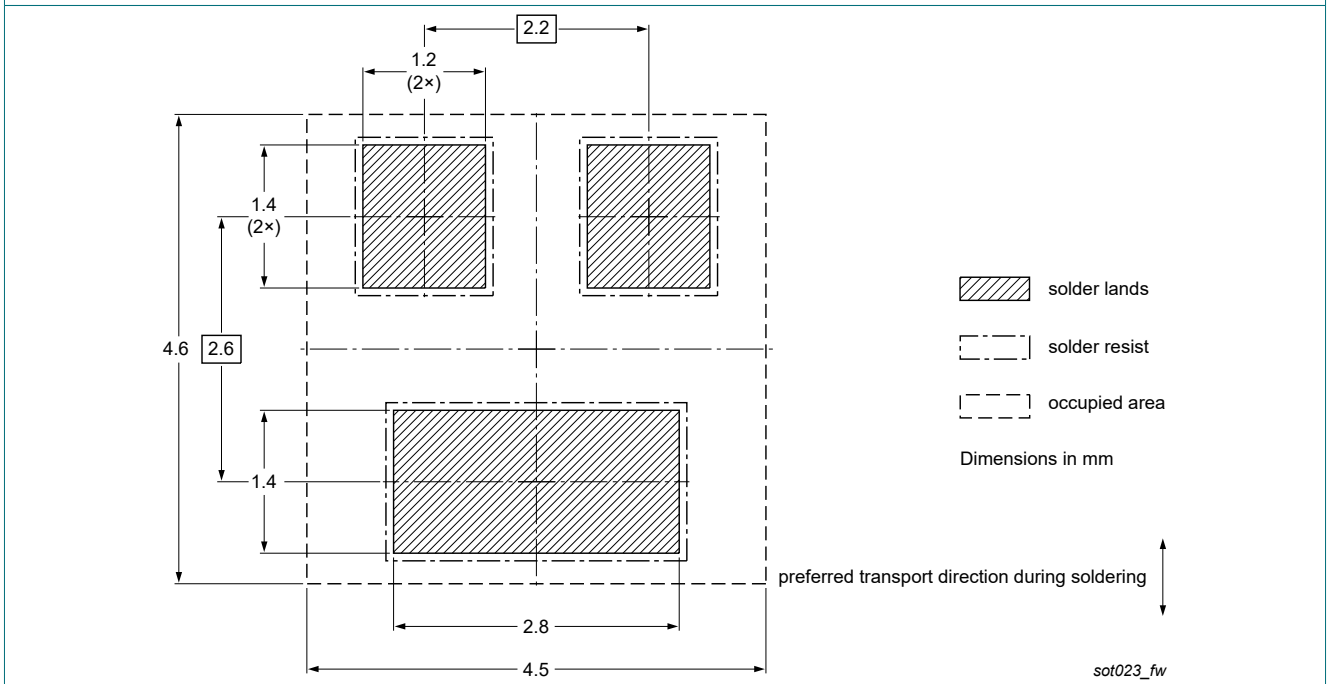


Fig. 7. Wave soldering footprint for SOT23

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------|---|-----------------------|---------------|------------------|
| BAT54S v.6 | 20220701 | Product data sheet | - | BAT54_SER v.5 |
| Modifications: | <ul style="list-style-type: none"> Family data sheet reduced to single type data sheet. Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s). Packing information removed. | | | |
| BAT54_SER v.5 | 20121005 | Product data sheet | - | BAT54_SERIES v.4 |
| BAT54_SERIES v.4 | 20020304 | Product data sheet | - | BAT54_SERIES v.3 |
| BAT54_SERIES v.3 | 20011012 | Product specification | - | BAT54 v.2 |
| BAT54 v.2 | 19990506 | Product specification | - | BAT54 v.1 |
| BAT54 v.1 | 19960319 | Product specification | - | - |

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".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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